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Employee Representation in the "New Order"

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FOREWORD:

President Roosevelt defines the "New Deal" and the "New Order" as a "new partnership" between government, management, and employees. This partnership is given standing by a new law bestowing certain rights upon the government, the employer and the employee.

The essence of partnership is mutual helpfulness, team-work, in which all partners cooperate harmoniously to attain permanent success. The winning factors in a successful partnership, however, are not legalistic. When standing on them, quarrels generally ensue, team-work is impossible and the partnership fails. The government, having invited itself into partnership, must be more than a policeman—rather an inspiring advisor with real responsibilities. The employer must be more than a production planner and seeker of fair profits, more than a fair competitor which is his legal right. He should seek also the increasing welfare of the employee. The employee as a partner must cooperatively do his share. Over-insistance upon the new legal rights of any partner will disturb that service. These three partners jointly must satisfy the general well-being of the public.

The President takes issue with those who complain of the "planless anarchy," the "Machine Age," "Invention" and "Machine Production" as being enemies to the wage earners and productive of unemployment. He does not call for the severe regimentation of industry and the elimination of the "profit motive," as do some of his advisors.

Thousands of employers have built a valuable asset of good will between themselves and their employees, both on an individualistic and collective basis. They have done much to humanize industry in this mechanized age. It would be unsocial and uneconomic for these new legal rights to interfere with that industrial asset.

Employee Representation is a forward-looking step taken under the "Old Order" by some industries as far back as twenty years ago. Under it, cooperative, free collective action, as contrasted with the new legalistic rights, uses the rule of "right" instead of "might" and preserves the constructive factors of rational individualism to the profit of all of the people.

Society will be well served if under the "New Order" this method of industrial cooperation be further vitalized as the foundation of American industrial democracy.

Mutual Confidence Built on Twenty Years of Medical and Personal Service Clears the Way for an Employee Relations Plan

THE ACCOMPLISHMENTS of the Machine Age have perhaps exaggerated the relative importance of machine versus man power. In considering the marvelous advances, say in the master tools of industry, sufficient attention has not always been accorded the man power behind their production. There is, in fact, one school of thought in Washington just now which is decrying the Machine Age and attempting to put the blame for many of our present adversities upon it and mass production. At the same moment, these new economists give out the impression that the Machine Age has obliterated the personal equation, the relationship between employer and employee, and that by some devious route not yet charted, we must return to the simple life, must find the way back to the old-time personal relations of master and man.

Unemployment Surpluses

Little recognition is given by these new industrial planners to the fact that thousands of plants, employing perhaps millions of men, have given very considerable attention to the maintenance of good relations; that through health, safety, and other educational movements, industry has done much to conserve its man power; that many managements, throughout this whole depression, have beggared their company surpluses in efforts to create work and find support for their trusted and experienced employees. These are the men who help build the quality into your machines. The axiom that a man is judged by the company he keeps might be paraphrased into the more industrial axiom that "a company is judged by the men it keeps." Our company's man power represents 11,000 years of continuous service or an average of seven and one-half years per employee.

Employee Relations

The continued success of any company and its employees will always depend upon a sound, far-sighted business policy, fair dealing with its customers, the making of a product of high quality in quantities sufficient to carry the payroll and overhead, and lastly but perhaps most important, upon the good will, confidence, and intelligent cooperative spirit between the employees and employer. To stimulate an employee to think considerately, to awaken his pride in himself and his work, to have him guard his health and that of his family, to get his cooperation in making his job and the place where he works have some personality—these should be fundamental purposes of any employer-employee relations program. Such a program will mean conference between the employer and the men.

Fair Wages

Through conference, employees usually become fairly well acquainted with the financial and other policies of their own managements and the competitive conditions which they must meet. This knowledge tells them that when labor presses for unreasonable wages, it can only result in loss to the business and unemployment to themselves; that the first mutual responsibility of employer and employees is jointly to keep the business intact, so that it may continue to function and to furnish employment. They are also in a fair position to measure the integrity and attitude of the management by the way in which it has dealt with the workers in periods of unemployment as well as in the prosperous years.

Human Maintenance

If it takes good mechanics, trained over a period of years, with a will to work, with pride in their jobs, and in your product, to do your work—what further can be done, as a part of a good relations program, that pays better dividends, other than to maintain them in good physical and mental status? No one questions the expenditure of money in maintenance of equipment and machinery. Obviously it is merely consistent to pay equal attention to the maintenance of the men who operate those machines. Failure to maintain the operator at his best fitness seems illogical since succeeding annual expenditures on him are many times those spent on machine maintenance. And yet, his physical fitness, his cooperation and his good will may be the very elements that reduce machine maintenance, and determine whether the machine produces profits.

Adding to the Life Span

When this company inaugurated its Employees' Service Department twenty years ago, it had little conception of how extensive and how valuable these services could ultimately be to itself and its employees. Preventive medicine and preventive surgery were two of its purposes. If a definitely lower absence, sickness, and death rate is a criterion, then some of its purposes are being fulfilled. It must be gratifying to management to know, for instance, that each of the hundreds of cases of acute appendicitis that have occurred has presented itself promptly to the department, has immediately accepted hospitalization either for observation or operation, and with no resulting deaths. We lost one employee from this disease who did not so present himself, with the unfortunate sequel of late surgical attention and death from rupture and peritonitis. In the same way, such diseases as tuberculosis, ulcers of stomach, heart disease, the common cold, etc., have been recognized in time for curative measures to be of assistance.

Epidemics

Physical examinations and medical supervision naturally control the infectious disease problems. In the flu epidemic of 1918-19, our absence rate was 7½ per cent, whereas the prevailing rate in some other plants went up as high

as 35 per cent. Our death rate for this flu period year was such that our premium for group life insurance covered our mortality costs, in the face of the fact that insurance companies lost many millions that year above and beyond their premium income for this line of insurance. A "Work Here and Live Longer" sign might well have been used by the employment department.

Equally gratifying to management must be the knowledge that when accidents do occur, whether trivial or major, these are at once cared for, and the employees are saved infections, lost time and lost wages by immediate, intelligent attention, and with permanent disabilities reduced to the very minimum. This phase of service probably pays for itself in lower compensation rates.

Adding to the Work Span

The maintenance of a dental service has added greatly to the medical department's ability to determine focal infections and to reduce the inroads of chronic disabilities such as rheumatism, heart, stomach, intestinal and kidney diseases. A case of what X-raying the teeth, followed by some extractions, did not only to relieve chronic rheumatism, but to keep one of our employees out of the hands of charity, may be interesting. He later admitted that he had never been able to hold a job elsewhere because of his continuing disabilities; that he always was in the hands of some doctor. For seven years after the removal of his foci of infection, he held the banner record for good attendance. Then came a slight recurrence, some X-rays, a few more extractions—when again he was most regular in attendance. In appreciation of his improved health he said one day, "Doctah, you done made a man out o' me. I always wuz good-fer-nothin' — no count befo' I worked heah." Can we escape the simple economics involved in adding some fifteen years to this negro's work span? Hundreds of similar cases might be quoted by any good industrial dispensary. Suffice it to say that executives and men alike, beginning with the president, avail themselves freely of the services of our Medical Department.

Saving Lives and Money

The intimate knowledge of the personal and medical problems naturally brought to early recognition the necessity of organizing a sickness fund to which all employees without exception now belong. Here again preventive medicine is stressed by having consultations, blood examinations, X-ray, etc., paid for out of the Mutual Aid Fund which thereby is enabled to pay more in benefits, over a longer period, for every dollar of dues paid by employees than any other sickness fund of which we have knowledge. To buy comparable sickness and accident benefits for our group would increase the costs to our men by at least 150 per cent. The company contributes nothing toward the Mutual Aid Fund, but supplies life insurance to its members. Incidentally, our death rate over these many years, has been so favorable that it is actuarily safe for the company not to purchase this protection, but to carry this risk itself.

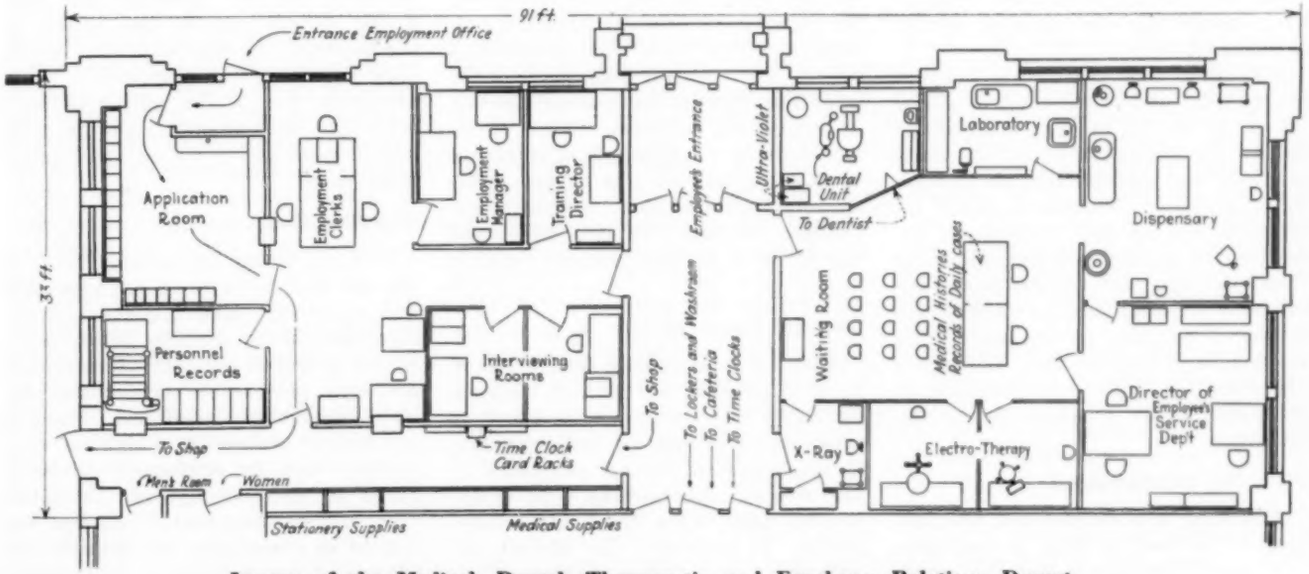
A Medical Clearing House

Such, then, are the types of services that we believe invaluable to our men and the company. Many are of a character that could not be purchased even if the men knew they required them. Even if they always had the money and the inclination to spend it, they would not know, in many instances, where to go for these services. In other words, the department acts as a clearing house for their ills, and many other personal problems. It is difficult to estimate the savings to our men and to society of such a department. A check made several years ago by our local social agencies showed that our men found less need for hospital and free clinical facilities than any other similar group of employees.

Personal Hygiene—Sanitation

It should be noticed that all these personnel activities had their beginnings in the application of some very simple principles—the establishment of a human maintenance department that should concern itself with industrial hygiene, industrial and non-industrial accidents, with industrial and non-industrial ill health; that would provide physical examinations on admission to the job; that would study absences from all causes; that would institute safety in the plant both by guarding the machinery and by educating the foreman and his men; that would improve the locker and washroom facilities and such other comforts and conveniences where the additional coast per employee might be negligible and yet would greatly stimulate personal hygiene and plant sanitation.

Two broad principles were supposedly put at work. In the first instance, the supervisory forces were given a little more personal appreciation of the things that entered into the employee's view-



Layout of the Medical, Dental, Therapeutic and Employee Relations Departments at the Plant of Cincinnati Milling Machine and Cincinnati Grinders, Inc.

point; that men are not all alike nor should they be paid alike; that their home conditions and physical status had to be taken into account in adapting the man to the job, in handling him from day to day, in measuring his final efficiency; that the days of inconsiderate or unreasonable treatment and the display of outbreaks of temper as a sign of authority were not in line with the times; that men could be led to do many things far more efficiently than they could be driven to do the same; that the company demanded fair treatment by both the foremen and the employee, each of the other. In other words, the human equation was to be taken more thoroughly into account: that unnecessary friction be reduced; that unfairnesses be prevented, and that natural friendly relations be established, thereby releasing, perhaps, new creative and productive energies. It was believed that if the company attempted a better understanding of the problems of the average man it would, through those contacts, establish in him a more sympathetic attitude toward its problems and difficulties; that greater pride by each individual in his work and in the final collective result or product of the company would be evoked.

"Time the Essence"

It was realized that these much desired results could only be accomplished through a long process of education; that such education would have to come through a newer attitude of the supervisors and again largely through the personal contacts made by the Employees' Service Department properly interpreting the policies of the company; that the significance of those policies would be measured by the concern and sympathy with which the worker's individual and personal difficulties would be met, whether they were physical, mental, or financial.

The usual gulf that exists between management and men cannot be closed by any lip service, but such a result can largely be attained through the thousand and one services that are afforded by a personnel department which includes a well-manned employment department, a medical and surgical service that is on a par with the standing of the company itself, all perhaps coupled with a general advisory service about such matters as health, injuries, Workmen's Compensation, legal aid, garnishments, threatened salary attachments, housing, recreation, etc.

Plans Not Superimposed

This then, was the task that the company set for itself in 1914. It was begun in a small, unobtrusive way and gradually won the confidence of the men through these multi-form contacts. The programs of the Employees' Service Department were not super-imposed, but were developed in line with the needs expressed by the employees. This progressed to a point where a very considerable number daily present themselves for some service or another, 75 per cent of which are for medical or personal reasons.

Employee Committee in 1914

It has wisely been said that no management should attempt to institute employee representation which does not have a real interest in its employees beyond their work as expressed in the pay envelope. This company had enjoyed good relations with its employees for thirty years before it established its Employees' Service Department in 1914. The president then realized that the rapid growth of the company demanded that its personnel problems be centralized; that medical supervision, in conjunction with modern employment methods, could be tied together and probably provide the most natural basis for sympathetic contacts and good relations. These activities, along with organization of the Mutual Aid, these thousands of friendly effective services, all carried on over a period of six years with the intelligent help of an elected Employees' Committee preceded the decision in early 1920 to effect an Employee Representation Plan.

Its last election was held by secret ballot in December, 1933. Thirteen employee members, representing from 75 to 100 employees each, to which number management adds 7, comprise our Employees' Service Committee. It acts, not only as a Board of Trustees for our "Mutual Aid" but extends its field of interest to all the manifold problems that are connected with the conduct of the Employees' Service Department, some of which have been enumerated above. The company feels secure in the belief that there is no question affecting its employees, including wages, hours, and working conditions, that it cannot frankly discuss with the elected representatives and that these discussions will continue to result in satisfaction and benefit both to the company and its men.

Men Are Generous

Years of experience in these relations have emphasized our mutual responsibilities to which are traceable efforts to lessen the hardships of the depression. A very generous position was taken by our men in mass meeting, held in December, 1931, when they voted unanimously to authorize the Mutual Aid officers to carry all ex-employees, laid off on account of no work, as full members entitled to sickness and accident benefits without the payment of dues. This splendid attitude was later broadened to include a very extensive relief program which required the expenditure of some $30,000.

Thus it may be observed that the mutuality of interests has been constantly evident. Misunderstandings, both on the part of the company and the employee, have been avoided or readily cleared up. It is not by chance, but through constant cooperative effort and foresight, that the relations existing between the company and its employees over these many years have been so cordial.

Industry Humanized

The second broad principle to be accomplished by all of the foregoing efforts (if the company's plans were to be successful) was that the average worker in the plant should feel that the company for which he worked was not only a producing institution of which he was merely a part, but also a human institution that took him personally into account with all of his good points as well as his weaknesses; that it was interested in his general well-being; that it was concerned in his trained progress from day to day; that it wanted to accord him fair treatment, but that it expected the same from him; that a company succeeded best when it enjoyed uniformly friendly cooperative spirit in the whole organization; that his success, so long as he was associated with the company, was bound up, more or less, with company success; that the elimination of waste, the prevention of accidents, the protection of the company's property, and a good honest day's work by the men as a whole was of real vital and selfish concern to him; that the company was not arbitrary, but that it had to have rules for the conduct of the business and that such rules would have to be enforced; that it tried to be absolutely fair in the setting of such rules; and that when it made an error it welcomed having its attention called to the same.

Receptive Hours

Is it not during the working hours of the day that men's minds are most alert and receptive? How important, therefore, that the impressions hourly made should be free of criticism. Unnecessary accidents, preventable occupational hazards, thoughtless treatment, wasteful methods of production, a slipshod wage system, where the employee is unable to check his own earnings, are all factors that lead to disagreeable relations and add to an unnecessary gulf between employees and management. Why should we tolerate them?

Which Leadership?

The far-sighted employer appreciates that the unclean, unsafe shop where the foremen drive rather than lead their men—where even the common or garden variety of human considerations are missing—is also the shop where the men's minds are daily poisoned against organized industrial leadership, and therefore opened to outside leadership that may offer itself. This employer knows that considerate relations throughout the working hours produces a state of mind or shop spirit, a certain morale, that makes for an appreciation of the necessity for effective organization and the part that each must play in it. Out of this mutual trust and confidence there grows a respect, not only for the industry but for society as it is organized, all making for a better citizenship.

The consideration of the health of the worker is but one factor in the important personal relations program. Contented citizenship does not grow out of a populace which is suffering from unnecessary illness and injury. Many so-called grievances can be traced to a physical basis. A real satisfaction should come to the intelligent employer in creating a good shop morale through these various methods. He also creates thereby happier contented conditions in the homes of his employees. And thus is effected a larger body of competent, responsible citizenship—the hope of continuing democracy.

Industrial Leadership

Men at heart are square and moved by the same human emotions. They all seek leadership. The condition of our democratic state largely depends upon whether that leadership is sane, intelligent, constructive. Employers are largely responsible for the prevailing type of leadership in our communities, for the right and wrong of our present industrialism so thoroughly affects individual and collective thinking that industry in the last analysis determines the character of the mass consciousness at any time. At no time in our history was this more true than at the present moment.

The New Order

The great mass of industrialists are cooperating with the President's ideals to hasten industrial recovery. They have patiently adjusted themselves to some very trying situations, made worse and more confusing than was ever intended by the President, through the unofficial, vocative interpreters of the "New Order." Industrialists recognize the good that has been made possible and that much should never be lost sight of, even after we have recovered from our present business dilemma. Opportunity is likewise at hand to plan more intelligently so that the employees of a particular craft may be saved from the effects of a ruthless competition and compensated more nearly in line with employees of other industries or crafts, always, however, in relation to individual ability and their contributions.

Collective Thinking

From the collective thinking, provided by the codes, it is to be hoped that there may emerge a common viewpoint on such debatable questions as unemployment insurance—all the more necessary from a competitive standpoint since our Constitution will not permit the adoption of a Federal Act. None of the State proposals so far offered presents a hopeful solution. However the combined intelligence of the leaders of industry should be capable of effecting some plan of amelioration of the great calamity of general unemployment—for joint action within each code makes it possible to avoid state lines and place the same on a national basis. So, too, the groups in charge of the respective codes might well encourage more general adoption of sound employee representation programs, for such would spell progress for industry and society.

A Guided Individualism

I believe that industry at large is more conscious of its social obligations than ever before. It should recognize the definite interdependence of the employer and employed groups. It must, for selfish reasons, if for no other, have in mind the social good of all the people. Industry's actions will largely determine whether American individualism can survive and can be so guided that it will still favor the energetic and yet not unfairly handicap the weak. There is still a long pull ahead before it can be said that we are planning worthily so that our succeeding generation may enjoy the America we like to think of.

Maintaining Democracy

As we view the great changes in forms of government abroad, we see how the whole world is in a social upheaval with the definite swing everywhere to the Left. Who is there that can say that we are proof against such upheaval? Does not the answer finally lie largely with the average American workman? I have great faith in his common sense, his fairness of judgment. Primarily, however, it lies with industry in its treatment of and in its relations with these men to impress the majority of employees so favorably with the fairness of the employing classes and our democratic institutions that they will always forswear any violent disruptive change in our present social system. Employee representation plans have within them the possibility of a real contribution to this necessary day of better understanding—of finer cooperation between employer and employee—the effectuation of an ideal industrial democracy.

Who Shall Do the Repair Work?

C. G. WILLIAMS

In any shop, it is well to have some man who may be called upon to repair the machines that occasionally get out of order, even though this man may do other work part of the time. It may not be conducive to the best efficiency of the shop to have outside men come in and make the repairs. There is a phase of psychology in such a procedure that is not always considered by those in authority.

It has been my experience that the morale of the shop is held to a higher plane if the men in the shop do all repairs. There is more effort throughout the shop to hold the machines up to the last notch of service, and especially if the shop repairmen, assisted by the operator of the machine, are called upon to make all repairs. It is also frequently possible to make the repairs in the time that would be spent waiting for the arrival of the machinist from the contract shop.

I recall two cases of breakdown of similar machines. In one it took two days to get it in operation, which included the time waiting for the repairman to come from an outside shop. At the other breakdown the operator called the foreman and then began to tear the machine down. Before the repairman reached the shop the machine, five hours later, was ready to run. The operator was reprimanded, but the machine stood up better after his repair than ever before. That shop now has several men who make repairs but who work on machines or on the assembly floor at other times. The management found that this method paid big dividends and held up the morale of the shop, as well as reducing the number of repairs necessary.

A milk evaporating plant found that it paid to have a man in the plant continually to pick up those little things that are so troublesome, but which are not large enough to call repair men in for. There are fewer repairs than formerly. It was only a step to making all repairs in the plant. A railroad shop paid five cents an hour more to repair men and it was always a mark of one's ability to be placed on the repair gang.

Punches and Dies for Small and Large Lots

Stampings are often required in small lots or for experimental purposes. Tool expense is usually the most important cost item. Some of the tricks employed by those experienced in building simple, low-cost punches and dies are told about in this article

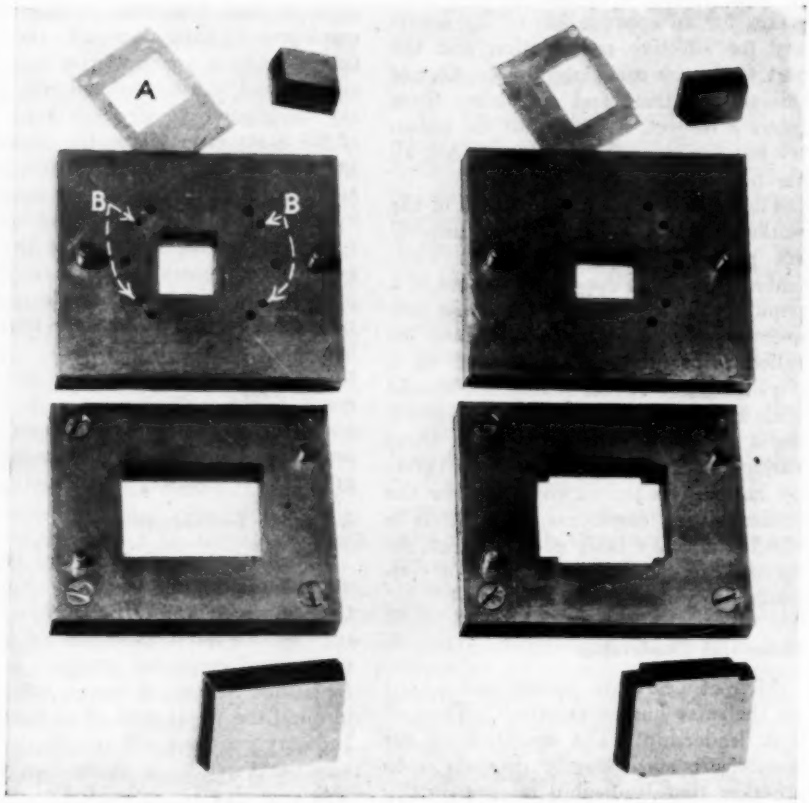


Fig. 1—Low-cost punches and dies for simple flat work in small lots

PUNCHES and dies for sheet metal work have made possible many changes in shop methods and radical reductions in the cost of parts produced. In many cases money has been spent unwisely in making up elaborate dies before the number of pieces to be made was determined, even approximately. While a large run can absorb the cost of the most expensive tools, they should be kept as simple as possible until the output can be estimated with fair accuracy.

Such problems have led to the development of methods for making inexpensive punches and dies for short runs. Some of these permit the makers to turn our small quantities at an astonishingly low price, which has been a boon to those needing parts in small lots.

One method of making low cost punches and dies for punching and blanking is shown in Fig. 1, which shows the die, punch and the work. Cold rolled steel plates are fastened together with space between them for the stock to slide easily. The upper plate acts as a guide for the punch or punches, which are placed in position after the sheet is inserted. The piece *A* is blanked in the lower die and is then punched in the die above. The piece is located by pins put in the larger holes. Loose punches in the four smaller holes *B* make the holes in each corner while the large, square-cornered punch takes care of the center hole. The punches and the punchings are forced through the die and the punches replaced for the next piece.

A similar job, with notched corners, is made in the other dies. Cold rolled steel, with carburized cutting surfaces, answers for a limited number of pieces. Drill rod, unhardened, makes punches for the same kind of work.

The labor cost of making pieces with these simple dies is of course higher than where the punch press can be operated at high speed. But on short runs this is frequently far greater economy than to tie up a lot of money on tools that may never be used again.

What may be called the next step in die construction is seen in Fig. 2. The die plates are of tool steel ½ in. thick. Pin stops are used, the round punches being of drill rod, not turned where the right size can be obtained. These are inexpensive tools and save time over the more simple types in Fig. 1 where the number of parts runs up into a few thousands.

Next comes a simple form of progressive die, Fig. 3. Here again the stock slides between upper and lower plates but a pillar die set is used to guide the punches. The strip stock feeds in from the right and has the five holes, of various sizes, punched at the first stroke of the press. Two sets of holes are punched before the first piece is blanked, so as to avoid too close spacing of punching and blanking die. The punches are guided by the bushings shown and the stock stop is shown at the left. The part punched and the strip at *A* show the sequence of operations.

Where the quantity warrants the ex-

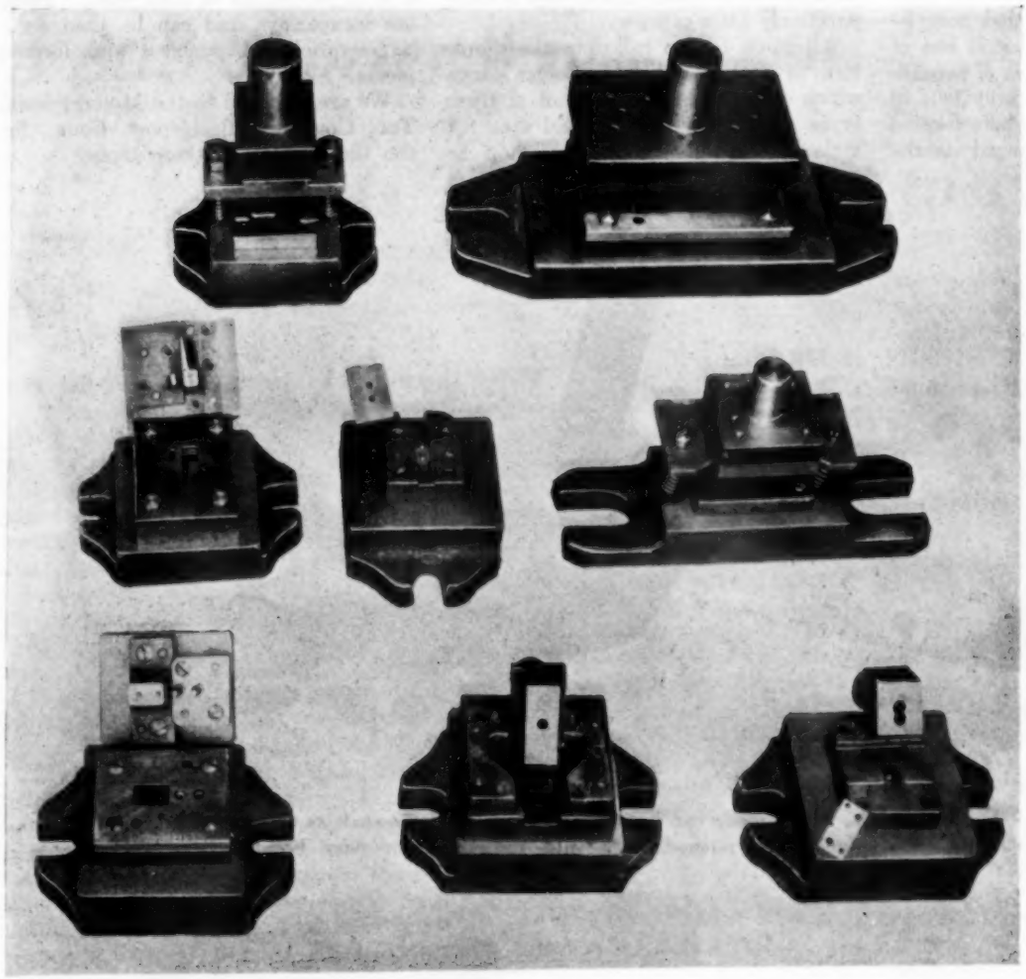


Fig. 2—Where only a few thousand pieces are needed, tool-steel die plates are fastened to cast-iron bases

pense the compound die, Fig. 4, will prove profitable. Here the pieces are punched, blanked and then pushed back into the strip so as to be handled more easily as they leave the die. Blanks will be accurate, all alike and flat, ready to be assembled.

Going still farther in the matter of simple dies, Fig. 5 shows a blanking punch and die for the pieces shown at *A*, and also some inexpensive dies for forming both the small angular ear and the round loop at the end. After blanking, the piece is laid in the V-shaped die *B* and the ear bent by the punch above. The piece is then laid in the recess in the small die *C*. The punch just above it bends the end and forms the first portion of the loop.

The loop is finished in the die *D*. The punch at the left starts the final curling with its thin edge, shown in front, and completes the circle as it forces the strip against the curve in the end.

To those accustomed to having parts completed at one operation this may seem slow and expensive. And this is true where large quantities are to be

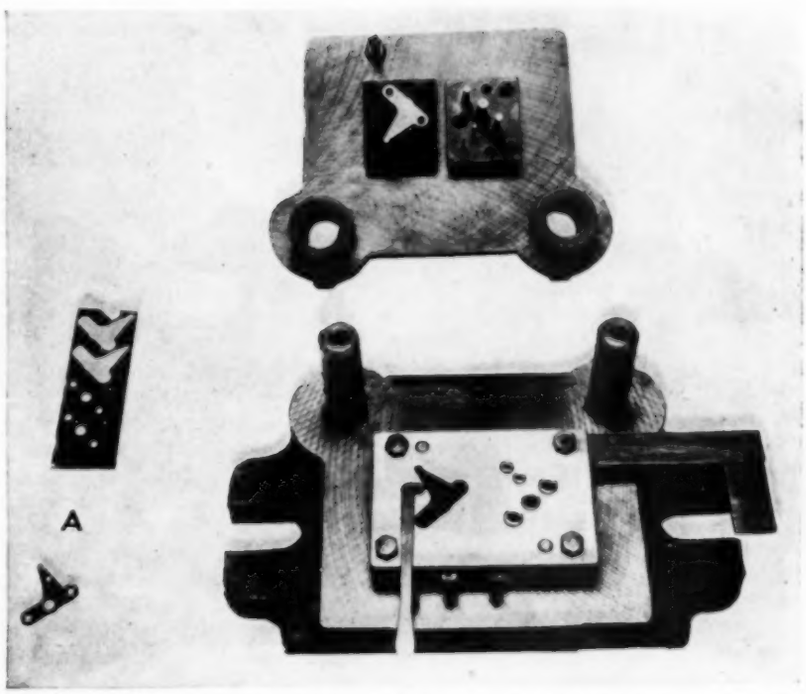


Fig. 3—Production is speeded to a marked degree by this simple progressive die

produced. But there are many cases where it is much more economical to have comparatively high labor cost than to tie up capital in tools that may be used but a short time. This is one of the cases where labor cost is of secondary importance. It is especially true in developing a new product where formed parts are likely to be changed as the instrument gets on the market. With simple tools like those shown herewith changes can be made rapidly and at comparatively little expense.

Attention is also called to the simple form of die bed and punch holder shown which can be made to hold all of these types of forming punches and dies. A little study will enable any shop to design standard forms of holders for both punches and dies that will handle a large percentage of their work. These are inexpensive and can be used on a large variety of punched and formed pieces.

We are indebted to the Moore Special Tool Company, Bridgeport, Conn., for the illustrations of these tools.

Fig. 4—For larger lots, where more can be spent, a compound die such as this can be specified. The blanks are pushed back into the strip for easy handling

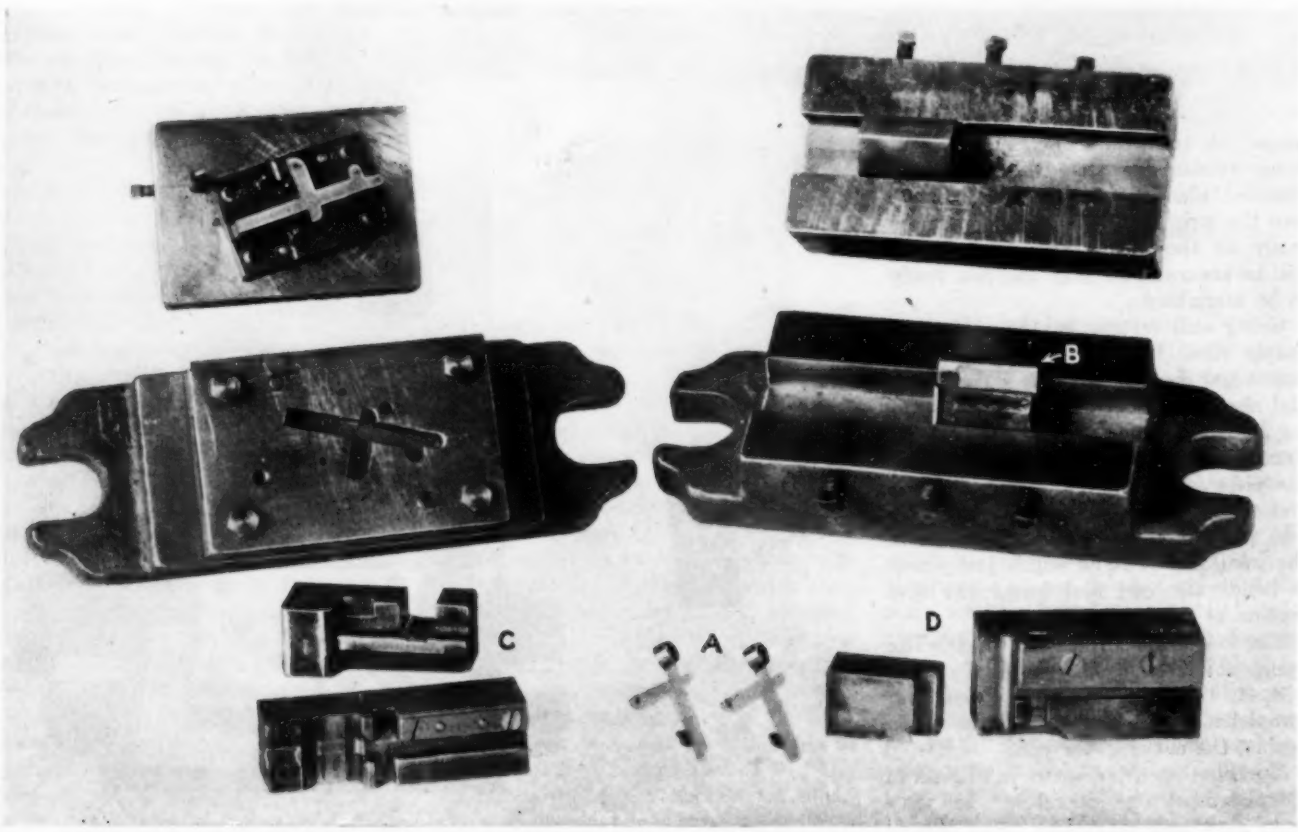


Fig. 5—This method of making simple blanking and forming dies can be modified to suit many conditions

A Still Shorter Work Week

. . . Is This the Road to Recovery?

RALPH E. FLANDERS
President, Jones & Lamson Machine Company

A GROWING body of opinion is moving us in the direction of generally shorter hours for industry as a part of the recovery program. The underlying cause of this movement appears to be some degree of discouragement in the recent progress of recovery and a feeling that that progress can be accelerated by a general shortening of the work week.

Such a policy could be carried out either with a degree of wage increase to compensate the individual workman for his decrease in hours, or without such an increase in wage rates.

If the latter policy is adopted, the evident result is a spreading of the available purchasing power without any increase in its total volume, or in the total volume of goods produced. Such a proposal is evidently one of relief—not of recovery—and it can have no part in a recovery program. It will in fact work against recovery. Its relief feature consists of supporting men now out of work from the wages previously coming to those now at work. It is thus a relief of the workers by the workers.

There are actual barriers to recovery in such a policy due to the decrease in number of those having earnings above the subsistence level. This will deal a serious blow to the revival of the durable consumer goods, luxury and service groups, which constitute primary elements of unemployment. The hope for reemployment of these groups in their normal occupations will be set back in a very serious way, since they are dependent on the existence of incomes above the subsistence level.

The above considerations forbid us to look upon the proposal for shorter hours without increased wage rates as being a relief measure of a desirable kind, or anything which will affect recovery in any other than a harmful way.

There are, however, a number of ways in which shorter hours with increased wage rates might be expected to affect recovery favorably. A number of examples will be considered—it being supposed in each case for simplicity's sake that full compensation is made in wage rates for the decrease in hours.

These various possibilities will be compared with an example which for this purpose may be considered as normal for a going industry under present conditions; said industry being considered either as a typical one or as representative of a cross-section of all industry—preferably the latter.

EXAMPLE I . . .

THE PRODUCTION of $100 worth of goods in a week may be assumed to involve the following expenses:

Fixed expenses	$ 18.00
Number of workmen—18	
Hours per day—8	
Hourly wage—50c.	
Daily wage—$4.00	
Pay roll	$ 72.00
Profit (10% on price)	$ 10.00
Output—100 units	
Price—$1.00	
Total sales	$100.00

In the above, the fixed expenses are supposed to include taxes, interest on investment, depreciation, insurance, etc. The labor costs include not merely the internal costs of the business but the labor which goes into all of the materials the business purchases, and into all the operations of transportation and distribution. The profit is supposed to include not merely the profit of the individual section of business which might be considered as typical, but the profit on all the operations involved in material and distribution as well as manufacture; it may also, if desired, include the element of rent. The same observations apply also to the succeeding examples.

EXAMPLE II . . .

LET US suppose that industry as represented by this example goes from a forty-hour to a thirty-hour week, and from an eight-hour to a six-hour day, raising the wage rate from 50 cents to 66⅔ cents in order to maintain the daily earning of $4.00. Let us further suppose that in thus raising the bill for labor a third, it decides to increase its sales price by the corresponding amount. The result is an increase of a third in the distribution of wages to labor, an increase of 4½ per cent in profit reckoned on selling price but 93⅓ per cent in dollars, and an increase of a third in the selling price, as compared with Example I. This is shown below.

		% Change
Fixed expense	$ 18.00	0
No. of workers—24		+33⅓
Hours per day—6		—25
Hourly wage—66⅔c.		+33⅓
Daily wage—$4.00		0
Pay roll	$ 96.00	+33⅓
Profit (14⅓% on price)	19.33⅓	+93⅓
Output—100 units		
Price—$1.33⅓ each		+33⅓
Sales	$133.33⅓	+33⅓

There is evidently no gain in this operation. The increase in wages distributed is the same as the increase in price so that the payroll will buy the same amount of output as before. Since there is no increase in fixed expenses with this increase in price the purchasing power of those to whom the fixed expenses are distributed will decrease owing to the rise in price of 33⅓ per cent. In the profit distribution, the purchasing power of those to whom profits go will increase. There will thus result a redistribution in purchasing power unfavorable to the workmen who will have as individuals no more wages but will meet with higher costs. The favor-

able aspect to those receiving profits may have a stimulating effect on business in ways which will be indicated later, but it is at the expense of wage earners as a class, who, as in the first discarded suggestion, are asked to carry the burden of relief among their fellow employees.

EXAMPLE III . . .

IN THE previous example, the excessive profit produced by raising selling prices to the same degree as pay rolls would seem to be the chief point of criticism. Let us, therefore, examine the situation when the profit increase is much more modest.

		% Change
Fixed expense	$ 18.00	0
No. of workmen—24		+33⅓
Hours per day—6		—25
Hourly wage—66⅔c.		+33⅓
Daily wage—$4.00		0
Pay roll	$ 96.00	+33⅓
Profit (8.8% on price)	$ 11.00	+10
Output—100 units		0
Price—$1.25 each		+25
Sales	$125.00	+25

In the example above, only ten per cent profit increase is called for. Other conditions being the same, this results in a twenty-five per cent increase in price. Here we have a situation in which all of the elements involved share in the burden of employing the six additional men. Those who receive the fixed expenses do their share in that they are unable to buy as much goods at the increased price. The workmen with their wages maintained are unable to buy as much of the goods produced and the increase in profit of only ten per cent is insufficient to finance as much goods as previously were purchased; thus all the elements in the situation have shared in the burden of supporting the six extra men.

This would seem, in view of the above, to be the optimum application of the shorter hours project, but it is not an attractive solution. The fundamental difficulty lies in the fact that there has been no increase in production. Recovery is fundamentally a process of producing and distributing more goods. Changes in profits, wages and hours are only a means to the end—not an end in themselves.

The reduced purchasing power of all elements in the above example would seem to give less chance for expanding the production of any class of goods than was the case even with the previous example, in which high profits might be expected to stimulate employment in the depressed luxury and durable goods industries.

Another objection to either of the two previous cases lies in the price increase involved. This disturbs the vital farm and industry relationship which is so necessary to both industrial recovery and political equilibrium. It is scarcely possible to emphasize this point too strongly.

EXAMPLE IV . . .

TO ANALYZE the results of reducing profits, let us carry this to the extreme, as is done in the example below where they are eliminated. At the same time let us be a little more modest in our increase in number of men employed and correspondingly shorten the hours to 7 only, with the expectation that the Government's endeavors to develop the construction program will take care of the remaining unemployed. Furthermore, let us tackle the "fixed expense," and reduce it somewhat by means familiar to those who have survived a depression. We thus set up what would seem perhaps to be a more favorable solution through the medium of shorter hours.

		% Change
Fixed expense	$ 16.00	—11.1
No. of workmen—21		+16 2/3
Hours per day—7		—12 1/2
Hourly wage—57 1/7c.		+14 2/7
Daily wage—$4.00		0
Pay roll	$ 84.00	+16 2/3
Profit	0	
Output—100 units		0
Price—$1.00 each		0
Sales	$100.00	

Here we have what on the face of it would seem to be the desired result obtained by eliminating profit and not going to extremes in endeavoring to spread work. We have the daily wage unimpaired, a larger number of men employed, and the price not raised. There is, therefore, on the face of it, no decrease in the standard of living. Since, however, nothing in this tends to increase the output, we would have an increase in demand resulting from the increased payroll without a corresponding increase in supply and, in accordance with the ordinary economic laws, an increase in the price would be expected to result therefrom so that the banished profit would tend to reappear. This is, of course, again an ineffective solution in that no more goods are produced and distributed so that there is no element of recovery in the operation.

EXAMPLE V . . .

IN THIS example let us represent what might be considered a normal reaction to the increased demand of the previous example, involving a modest profit.

		% Change
Fixed expense	$ 16.00	—11.1
No. of workmen—24		+33⅓
Hours per day—7		—12½
Hourly wage—57 1/7c.		+33⅓
Daily wage—$4.00		0
Pay roll	$ 96.00	+33⅓
Profit (2% on sales)	2.29	— 7.7
Output—114.29 units		+14.3
Price—$1.00 each		0
Sales	$114.29	+14.3

More men would be hired to fill the demand for more goods, and there would be thus an increase in output. We would therefore, for the first time, begin to make progress toward real recovery. There being no increase in price but an increase in output by the amount of the added weekly hours, there still remains an element of relief with this small degree of recovery in that while employment has been increased one-third, the amount of goods produced has increased only 14.3 per cent. There is thus no possibility of the workmen who are already employed having as much individually as they had before readjustment.

The above are all arbitrary and somewhat formal examples. At first thought it may seem useless to go through these procedures. There are, however, quite definite reasons for doing so. There must be in the minds of those who are proposing shorter hours as a recovery policy, some vague indefinite calculation of the types given above. Just what that calculation may be, we have no means of knowing. It may be possible to put it in such shape as to make a good case for shorter hours as a recovery policy. If that can be done, the proponents of the policy should be urged to put it in convincing form. We have been unable to find any such form.

EXAMPLE VI . . .

LET US now, however, suggest a solution of the problem of recovery which is not that of shorter hours, but operates through the normal processes of improvement in productive efficiency and the lowering of costs. Let us suppose that the typical industry or the typical cross-section of industry is able by one means or another to install improved equipment, thus raising its fixed expenses in the process. Let us suppose that this equipment is of somewhat larger capacity, and that the total result is as shown below.

		% Change
Fixed expenses (new equipment)	$ 30.00	+66⅔
No. of workmen—24		+33⅓
Hours per day—8		0
Hourly wage—50c.		0
Daily wage—$4.00		0
Pay roll	$ 96.00	+33⅓
Profit (10% on sales)	$ 14.00	+40
Output—140 units		+40
Price—$1.00		0
Sales	$140.00	+40

This is the normal process of recovery and of all industrial progress as well. Here we have all elements of the problem taken care of. The new equipment has stimulated the depressed capital goods industries. The full available body of workers has been employed at unreduced wages on the eight-hour a day level. The price of the goods produced has not been increased so that the agricultural-industrial relationship has not been disturbed.

There has been a considerable body of profit developed so that there is some assurance that the luxury and service industries will be stimulated and unemployment be absorbed in these as well as in the purely productive industries. This last matter is of particular importance. A concentration on the productive industries leaves out of account the fact that a progressive development of our type of civilization means a progressive extension of these "non-productive" industries.

Example VI is not necessarily the optimum solution. The optimum solution will provide for larger purchasing power to the individual worker in addition to increasing the number of those employed. The example does exhibit the essential element of increasing the amount of goods made and distributed by industry.

Doubt Hampers Recovery

For the optimum solution there are certain essentials now lacking, particularly with reference to the depressed durable and capital goods industries. For their revival there must be faith in a revival in profits and confidence that our present process is well based and will form a firm foundation for the future of private business enterprise. Both of these necessary conditions are destroyed by the proposals to shorten hours, as is shown by the analyses above.

The extent of this doubt which so seriously hampers recovery has been revealed in a survey recently made by a committee of the American Society of Mechanical Engineers, which has been distributed to members of the Industrial Advisory Board. This report was made from a study in six industrial cities, of varied industries. In brief, out of the total of 169 concerns interviewed, 112 of them are optimistic; yet 115 were making no plans for modernization of equipment and 94 had no expectation of making any such investment in the near future. This background of doubt will be intensified, not diminished, by a general policy of shorter hours; and the prospects of recovery on the part of the depressed industries will continue to be handicapped thereby.

RECAPITULATION

NORMAL recovery of the type indicated in Example VI will be one which produces more goods and increases purchasing power in the terms of an increase in goods, rather than in arbitrary dollars or hours. It will revive the capital goods industries. It will encourage reemployment in the luxury and service occupations. What is exceedingly important—it will furnish the profit for a degree of taxation which will support the tremendous program of governmental expenses in which we are involved. Without those taxable profits our whole project will crash. Finally, this normal recovery provides a natural transition from public to private enterprise.

There are certain misconceptions which we must get rid of if we are to direct the progress of recovery toward this normal route. We must get rid of the specter of over-production. There was no general over-production in 1929. The standard of living of large masses of our population was so low that if it were raised to the limit of decency, our normal output would be far above the 1929 level.

The extent of excess productive capacity is largely a product of panic-stricken imagination. While existing in individual industries, almost every journalistic analysis proves it to be based on unfounded statistics. In particular these estimates of excessive productive capacity take into account neither the desired consumption standards of the country nor the high degree of obsolescence in existing equipment. Finally, they assume a degree of standardization of product and of mass production which is neither existent nor desirable for the future.

Perhaps the idea of over-production has been generated by the spectacular nature of a field in which it really did occur, namely that of urban real estate development in the form of hotels, office buildings and apartment houses. This constituted a major dislocation of our economic process. The great and unwarranted expansion in this area was financed not by profits and savings, but by credit inflation; and the necessity for paying for these developments in solid money is a large element of the deflationary disturbances which we have had helplessly to endure in the succeeding months.

RECOMMENDATIONS

1 Reduction in hours should not be adopted as a general policy. It should be considered only with respect to specific industries as in the case of the textile industry. Here a current lack of demand permits the spread of the available work throughout the mass of workers, by the simple expedient of a reduction in hours. This is a rational relief process and an adjustment to diminishing demand. It is not a recovery process.

2 The government's proposals for encouraging housing developments should be supported in every way. About half of the unemployment in the capital goods industry is accounted for by the construction industry, and will be relieved by suitable action in this direction.

3 The equipment branch of the capital goods industry and its dependent raw material industries can be encouraged by suitable governmental policies. The first is the encouragement of the processes of investment. At the present time this is deadlocked. The government insists in safety of investment, and the investment banking corporation is concerned about the ease of its normal operations. It is necessary here for the government to concern itself also with ease and the investment bankers with safety. A coming together and a broadening of viewpoint of both is essential to a normal recovery.

4 New methods of financing intermediate credits for new equipment are required. This relates to the type of financing which is too small for bond issues and of too long term and of the wrong type for commercial banking. Undertakings of this sort are now being studied by the NRA and RFC organizations, and can properly be applied wherever they are justified by savings at the present level of business. It is believed that the amount of this justifiable investment is of considerable proportions.

IN THE encouragement of these normal processes of recovery lies the best hope for progress in the few months just ahead. Misconceptions as to over-production and over-capacity and hasty suggestions as to reductions in hours with corresponding reductions in output and consumption, bear a great resemblance to the remedy of "bleeding" as practiced by the physicians of a century or more ago. The normal processes described above bear more relationship to nourishment of the economic body and the building up of its functions, and are representative of the character of the industrial hygiene on which we must depend for the future health of our civilization.

Methods of Making Casing and Casing Couplings—III

P. H. BRYANT

Gaging is the subject of the third and concluding installment of this series. In his previous articles the author described various ways of forming and machining casing and couplings

IN THE manufacture of casing and casing couplings, gaging methods are already well standardized, although not all the producing sources are equipped with gages and testing devices to the adopted standards. Before a designer undertakes, even mentally, to solve in his own way the problems indicated herein he should secure from the American Petroleum Institute its latest data on material specifications, gaging methods and allowable tolerances in machining dimensions. In any part, characterized by two internal tapered threads meeting and merging at a common mid point, there is a close relationship between certain of the gaged dimensions which makes it essential to treat them as a group.

To attempt to cover the subject of gaging in detail, even as regards one class of the product under consideration, would run into complexities beyond the scope of this article. However, certain characteristics of the industry need to be made clear in order that tool designers or equipment manufacturers interested in the prospects it offers for future business, shall understand its peculiarities before starting development work designed to meet its needs.

It is commonly known that a transcript of all, or any desired part, of the standards of workmanship and working tolerances specified by the American Petroleum Institute for the purposes of this industry, can be secured at nominal cost from its New York office. What is not so well known is that the process specifications and limiting dimensions, put forward to date by the A.P.I., do not cover all of the dimensioned details to which tolerances have been given by producers themselves, and that, in many instances, the institute specification has been displaced by other and much closer tolerances set up by plant engineers for their own production departments.

Confronted with the task of promoting uniformity of method and output in an industry that at the time was not strongly impressed with the need of such uniformity, the standards committee, when it undertook its work, was early convinced that to attempt at that stage to impose on the industry a complete set of arbitrary standards would nullify the prime objective of the cooperative organization. Consequently, only tentative standards were put forward at first, and those covered only such details as were acknowledged to be at great variance in the products being manufactured.

While this policy, of doling out half-portions of approved tolerances only so fast as the industry could digest them, was unquestionably good judgment on the part of the committee, it became at once apparent to the more far-sighted producers that, having undertaken the standardization of their product and all that it entailed, the quicker it was accomplished and the more nearly the whole contemplated development came within the scope of their initial plan and appropriation, the sooner would benefits begin to accrue and the smaller would be the item of cost. Thus considerations of utility and economy alone, since the first tolerance specifications were issued in 1926, have kept certain of the producing plants well in advance of the institute in progress towards 100 per cent standardization.

A second factor, influencing the manufacturers in this regard, less economic but very compelling, was that the final test that each threaded pipe end and coupling was required to pass, was that "when made up on a pipe screwing machine, the threads should fit perfectly and *show no leak when subjected to hydraulic pressure.*" With such a specification written across the face of the final inspection hurdle, is it any wonder that producers of these materials should be concerned about thread form and depth, refinements of alignment and taper, and many other items of detail in respect to which the A.P.I. has set liberal tolerances or none at all?

Another characteristic of the standardization of this industry is in the fact that, although the work has been going on for the better part of ten years, there has not been established any basic of master standard of diameter corresponding to the nominal O. D. sizes under which the products of the industry are listed. In the machine tool, automotive and kindred industries, if a tolerance over or under a specified size is adopted, it establishes definite limiting dimensions that would be universally accepted and worked to. In the pipe and coupling industry, whereas size tolerances have been fixed and universally applied, no master size from which these tolerances are variants has been established, and, except as regards drill pipe on which tentative standards have been set

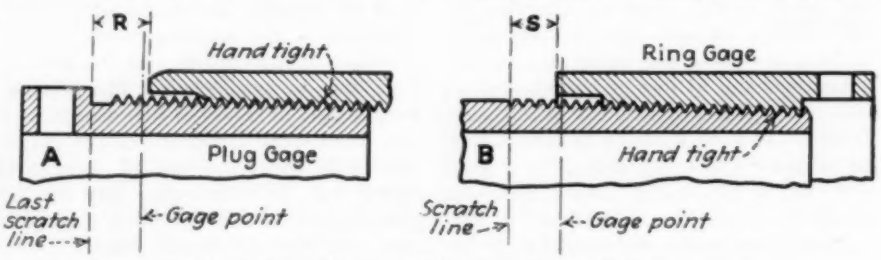


Fig. 9—Approved types of master ring and plug gages

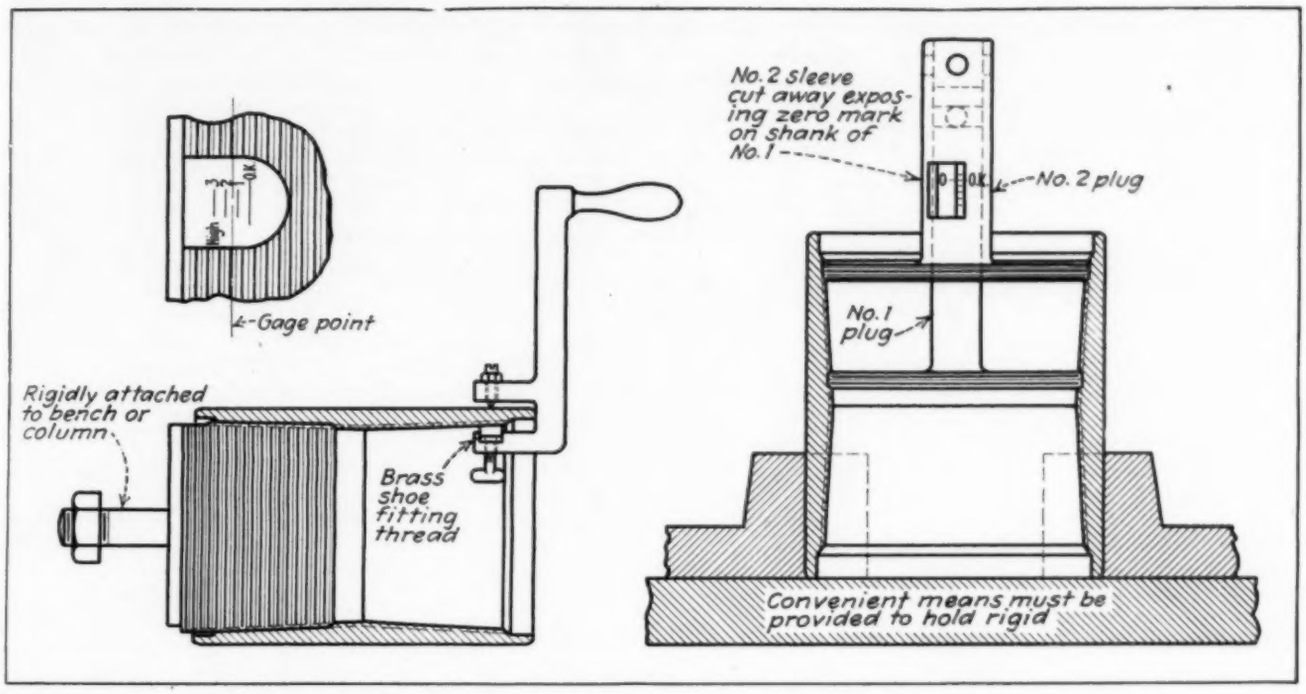

No. 2 sleeve cut away exposing zero mark on shank of No. 1
No. 2 plug
No. 1 plug
Gage point
Rigidly attached to bench or column
Brass shoe fitting thread
Convenient means must be provided to hold rigid

Fig. 10—The shop method for gaging rates couplings so many turns high from a "dead on" minimum. Fig. 11—An accurate check on taper may be obtained by the use of a double plug

as a feeler, no attempt has been made to do so.

On the great mass of petroleum goods production, discretion is given each manufacturer, the institute ruling being that "each manufacturer is permitted to determine what stand-off from the shoulder (dimensions *R* and *S* in Fig. 9) is best suited to his own materials and methods of manufacture." To the lay mechanic this would seem to be standardization without standards, but when the controlling conditions are understood, it does not seem quite so inconsistent.

The reader should understand that there was one feature of the problem that confronted this industry, and still confronts it for that matter, that has no exact counterpart in other fields of standardization. The major production processes in this instance center around the machining of male and female elements of tapered threaded parts, and that taper an unusually "flat" one, so flat in fact that a comparatively small variance from the correct size relationship between the two fitting parts will render the joint, when made up, unusable for its designed purpose.

It should not be thought that during the life of this industry, prior to the efforts of the institute to introduce the manufacturers to methods of uniformity and accuracy, that test gages and inspection were unknown and unused in its plants. In a majority of the mills, the threading of the pipe and the tapping of the coupling were carried on in widely separated departments, and comparable test rings and plugs had to be used to meet the practical requirements of production and service in the field.

But producers have always centered attention on relativity between the mating parts, and shied from the establishment of, or adherence to, dimensions that were a function of the machined diameters, because their requirements were fully met when the parts produced fitted together the way they wanted them to fit, and the control of thread-turns relationship was the simplest and cheapest means of securing such a fit. Consequently, a coupling or pipe end that was "dead-on-the-line" when tested with a plant's own gages, might be over or under, and in some instances scrapped, if tested with the working gages of another plant.

The difference in individual standards is so great, that had the industry been forced to readjust itself to a single master size for each nominal O.D., a large percentage of the then unused manufactured materials would have been rendered worthless and a loss of millions incurred.

Unless this point regarding the variance of standards is understood by those contemplating entering any field related to this industry, it will continue, as in the past, to be a costly source of engineering friction and errors. Also the distinction between master gages and working gages should be clearly established. No variance is allowed in the masters. They are manufactured to sizes and limits prescribed by the American Petroleum Institute; checked, and the checking record certified to by the Bureau of Standards; and the gages put away by the purchaser for reference purposes only.

The variant is the amount that a part testing O.K. on the plant's working gages, will stand off from the last "scratch-line" if compared to the master This amount, as has been explained, is left to the discretion of each producer as the most practical means of avoiding incalculable confusions in stocks and losses in the field.

As regards details of present gaging standards and methods, there are but two angles to these phases of the subject that are important to the reader. They are: To what extent have the producers outstripped the A.P.I. and set up standards that can be ascertained only by becoming familiar with present engineering and shop practice in representative plants; and what are the major practical points of design and service that influence the trend of development towards 100 per cent standardization?

The essentials of both phases can be covered by the analysis of the machining and gaging processes on one class of product, requiring the maximum of accuracy, oil-well casing couplings, because the problems of that one product are broad enough in scope to be inclusive of all other products and problems.

Size is of first importance. As explained, without regard to what it is in theory, in practice it is dealt with only in terms of thread turns that the part being tested falls short of, or overruns,

a marked gage point when an inspector, with a controlled expenditure of effort, screws it onto the test gage.

Fig. 9, A and B, are illustrative of approved types of master ring and plug gages. Working gages are similar in basic design but vary in detail in the various plants in order to suit differences in inspection technique.

Prior to the move towards standardization, plants had been giving themselves a tolerance of four to six threads on the working gage. The present A.P.I. tolerance is two turns for products tapered ¾ in. per ft. and three turns on work tapered ⅜ in. or 3/16 in. per ft. These tolerances are officially expressed as half the total plus or minus from a basic gage point.

No manufacturer, so far as I know, has tried to better these tolerances. In fact for years after they were put forward, it was impossible for many producers to work that close and still continue to use the equipment and methods of the past. Moreover, no new equipment has yet been designed and made available to this industry that approaches 100 per cent production within the prescribed tolerances for size, the "scrap loss" from this gage alone being a percentage of the total materials put into process that would cause consternation in any other industry.

While the master gage establishes a medium gage point and specifies a plus or minus tolerance, it is practice on the working gages to use the minimum passable size as the base line and rate a tested part as "dead on," or so many turns "high" from that line.

There were two reasons for this change in marking. Gaging the tapered threads is a "hand-tight" operation, and no two inspectors will set up a gage on a pipe end or coupling to exactly the same point. Obviously, if the machined size was such that both screwed the work up to the base line, it could be rejected on subsequent inspection only by going the *total allowed tolerance* beyond that point.

Conditions that would hold it "off" in this preliminary inspection are out-of-roundness or particles of dirt in the threads of either gage or work. These factors, having always to be reckoned with, it has proved of decided advantage to hold closely to the base line, or minimum size, leaving all of the tolerance on the side of the human variants.

Also the change in base line marking has simplified shop telegraphy. The plus and minus designation of gage limits gave rise to frequent misunderstandings between inspectors and machine operators. By the present preferred method, a part gaging up to, or a fraction beyond, the base line, gets an O.K. gesture, while an overrun is indicated by the inspector holding up one, two, or three fingers, the operator being thus kept constantly informed as to how his tool settings are reproducing size.

Second in importance to size is taper per ft. The A.P.I. tolerance is 1/16 in. increase in taper in 12 in. or 1/32 in decrease, from the specified taper per ft.

While processed material might not be rejected so long as within these limits, most producers have perfected methods that make it possible for them to work much closer. It must be borne in mind that there can be no "selective assembling" of these materials. The speed and certainty of results with which each coupling must screw onto a pipe end, when a string is being made up, puts any matching up of inaccuracies out of the picture.

Without selectivity, it becomes hard to reconcile the screwing together of a female threaded part tapered 7/16 in. per foot and a male end tapered 11/32 in., both being within the allowed tolerances, with the crucial specification that the threads must make up tight when subjected to hydraulic pressure. Since it cannot be reconciled, a majority of producers are working much closer and striving to hold inaccuracies on the side of "flat" tapers because experience has shown that tolerance in that direction results in a greater average of tight joints.

Until extra close taper control became the practice, taper gaging methods were crude and uncertain of results. Flat profile gages were used for the most part, the quality of inspection being a reflection of the experience and judgment of the inspector.

Ends of Taper Measured

This form of gage is still used for checking taper bores, but experience has convinced many producers that accuracy of the bored taper is of prime importance in insuring the production of a passable thread. Consequently, the more progressive plants have established dimensions for the minimum bore (the diameter at the meeting point of the two reverse tapers) and for the diameter at the large end of the taper, and are checking work by micrometer measurements as compared to a table of dimensions for that part.

The reader should bear in mind that such dimensions are not computable except that the difference between the two is a function of the specified taper and the distance along the axis between the two measuring points. They are varied by differences in basic standards for size —explained in earlier paragraphs—and by boring practice as influenced by what experience has demonstrated will get the best threads.

The present approved form of gage for checking tapers is shown in Fig. 11. It will be seen at a glance that a gage of this design can only be used for inspecting tapers varying between close limits, as so wide a variance as is permitted by the institute would repeatedly carry one or the other of the fitting plugs beyond the gaging range before it was tight. A representative producer calibrates the gage in sixteenths of an inch and allows himself a total tolerance of $\frac{1}{16}$ in., mostly on the side of flat tapers.

The alignment test is next in importance, but does not, like size and taper, come in for 100 per cent inspection. The degree to which the axes of the thread cones in each end of the coupling vary in alignment is largely a reflection of certain basic characteristics of the machining method used, rather than any detail of skill or supervision. Only occasional tests of alignment are taken, therefore, since once a method of tooling has been shown capable of producing

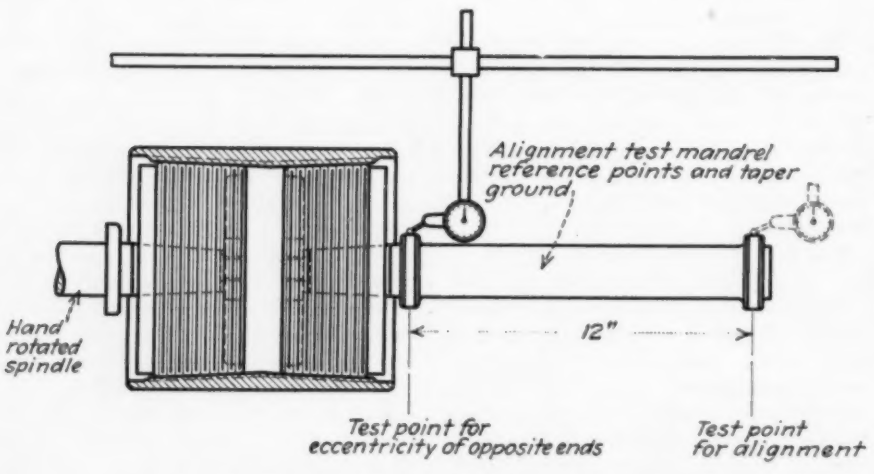

Alignment test mandrel reference points and taper ground
Hand rotated spindle
12"
Test point for eccentricity of opposite ends
Test point for alignment

Fig. 12—Eccentricity and alignment may be gaged by dial indicators on a test mandrel

within certain alignment limits, it should continue to do so as long as the producing equipment was kept in good repair and adjustment.

The institute tolerance is expressed in terms of a fraction of an inch of distance between the two axes at a point twenty feet from their intersection, ¾ in. for a majority of products, ½ in. in the case of some specialties. Most shops have translated this into its equivalent in surface indicator readings on the type of testing equipment shown in Fig. 12, and then halved or quartered the official tolerance.

This same equipment is used also for testing for eccentricity between the two halves. This, theoretically, is the distance, if any, between the axes of the two halves of the coupling at the longitudinal center. In practice it is not measured at that point but dealt with in terms of one-half the difference in surface indicator readings at the reference point on the alignment gage nearest to the coupling end.

Prior to June, 1932, no tolerance for eccentricity was specified, and then an off-center distance of $\frac{1}{32}$ in. was declared permissible, certainly not a limit that it should be difficult to work to. Both the present authorized tolerances for alignment and eccentricity are in the nature of a concession to those manufacturers that are still using some considerable part of their old equipment and methods for the production of a percentage of their output. Even though some or all of these manufacturers are at present well along the road toward a complete replacement of all tools of antiquated design, it cannot be until all plants have made 100 per cent replacement, that tolerances such as these that reflect equipment quality, can be brought into accord with the present state of the art.

Thread Form Refinement

Size, taper, alignment and eccentricity of the threaded halves of the coupling, represent the outstanding points of interest to the production departments. Many producers, however, are carrying refinement of details far beyond these points, not only at the inspection bench but back in departments of engineering research and tool design where it is now recognized that the quality of what is there created is a measure of the best that can be gotten in production.

The greater part of this refinement centers around the thread form. The institute specifies a National, or American Briggs Thread, and lets it go at that. In not distant past, the form of thread actually produced in this industry, varied in so many respects from the theoretically correct specification that it was impossible to rule on its passability except on a basis of personal judgment based on sight and feel.

At a creditable pace, the means both to enable the shop to produce accurate threads and to gage the quality of the work produced are being perfected and provided, although there is still a long way to go in this direction.

The pitch of the thread generated has of late come in for a great deal of attention. The approved tolerance is

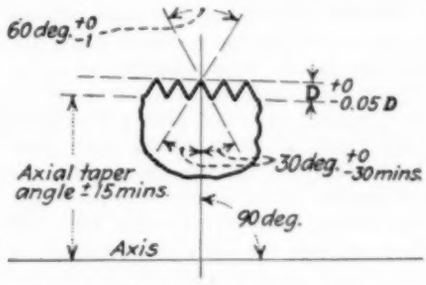


Fig. 13—In some plants, tolerances for thread characteristics have been set

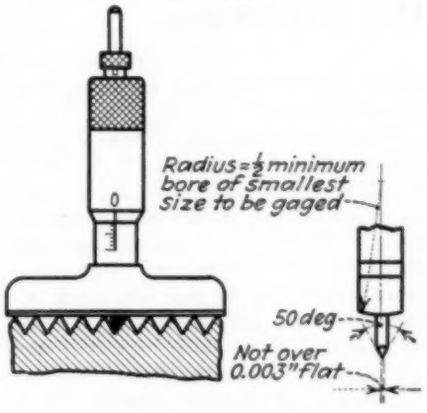


Fig. 14—A micrometer thread gage insures full depth

a plus or minus variation of 0.001 in. per in. It is measured with a special spacing indicator, the most commonly used being a Wolfe gage. The methods of some manufacturers produce what is termed a "continuous thread," that is, a correct helical pitch is maintained between the threads of the two halves although their thread-pitch lines are at an angle. This matter of a continuous thread has been one of unending controversy. Those, who have the means to produce it, claim it is essential and go to the point of complicating their production and inspection in order to maintain it as a feature of their product. Those that cannot produce it, say its virtue is in improved appearance of product and that it serves no useful purpose.

Purely from the standpoint of tool design, those methods that are susceptible to close control of alignment and concentricity of the two halves, lend themselves more easily than otherwise to the production of a continuous thread. I believe the trend is definitely in that direction although it is a fact that of the two most recently designed special machines for coupling production, one by a Cleveland the other by a Pittsburgh tool plant, the first must of necessity produce a continuous thread, while the method of the second makes its production impossible.

Where continuous threads are produced, the pitch distance between the halves is held to a tolerance of 0.005 in. for ¾ in. taper per ft. and to 0.003 in. for the lesser tapers. A spacing indicator having a spread of 3 in. is used.

In at least two plants, tolerances have been set for certain thread characteristics as indicated in Fig. 13. Unfortunately, in the case of couplings—that product of which it is most difficult to produce passable threads—it is the most difficult to gage results. Comparator inspection of coupling threads requires the preparation of sawed sections from selected samples, a tedious and expensive process and one that is difficult to connect with actual shop conditions. Much of the work along this line finds its present reflection in specifications for new production tools, particularly thread chasers and hobs.

A Source of Leaky Joints

"Flat tops" have long been a stumbling block to producers of threads on tubular goods, and so long as the reduction of thread depth appeared slight and the top smooth to the feel, it was passed as of minor importance. When research laboratories made up threaded joints, sawed them into longitudinal sections, ground and polished the faces of those sections, and studied magnified photographs of those faces, it was discovered, among many other interesting things, that a flat top made a helical conduit the entire length of the thread contact sufficient to cause a leaky joint if the thread was perfect in every other detail.

Thereafter, special attention was paid to thread depth, and some of the plants have set tentative tolerances. They are working toward a minus limit of 0.005 in. for 8 pitch and 0.004 in. for 10 pitch, but it is going to mean a long series of refinements from threading tools down, before these tolerances can be uniformly held. For testing thread depth, a type of micrometer gage shown in Fig. 14 is used.

Accuracy as regards certain seemingly unimportant details is influenced by individual methods of manufacture and by the character of the service for which the product is intended. For example, the recess diameter at the end of the

couplings covers essential requirements if it is 3/32 to 1/8 in. larger than the casing O.D. But in practice provision must be made to hold this dimension to close limits, because some producers use the recess for locating purposes during the threading operation, and should the locating plugs be loose fits, it would produce out-of-round threaded ends. Also the flat ends of the coupling cannot be faced in a cutting-off operation, as some producers have attempted to do, because it is essential that these ends be true with the axis of the thread. This flat face rests on the "elevator" at the well and unless faced true will cock the coupling and increase the chance of an entering thread catching or crossing in the act of adding a new length of casing to the string.

An analysis of the characteristics herein outlined should indicate to designers of machines and tools for the purposes of this industry, the importance of informing themselves before they start regarding standards, shop practices, and such other special conditions as are of a nature to govern sales.

It means nothing to those authorizing purchase requisitions that a piece of equipment or tool submitted for test meets or betters every requirement of the A.P.I. specification. If it does not at every critical point better the results being obtained from the method in use, it will be given scant consideration and never be productive of sales.

On the other hand, the plant officials engaged in producing these materials, are not nearly so stand-offish or as intolerant of suggestions for cooperative development, as they were a few years back, and in those plants that have special engineering departments for the purposes of this product, it is no longer difficult to contact with men that will give one both the technical and practical side of the whole picture.

Johnson Tells His Salesman

JOHN R. GODFREY

Besides building motors Old Man Johnson also builds several machines that have a number of machine elements, such as cranks, gears and the like. One of these he took over from a concern that found hard sledding in these times and he's trying to get the sales up to where he can more than break even. I dropped in the other day when Tom and the Old Man were having a seance with the salesman they took over with the machine. The salesman was at the bat as I entered.

"We've got to get the price down on those machines, Mr. Johnson. Then, I can sell 'em fast enough. Either put the price down or put on some more gadgets that I can talk about."

"That's what ails them now, I think, Beasley. Tom and I have been looking them over and we feel that they can be greatly simplified. There's a lot of unnecessary work on them. Connecting rods are finished all over, steel gears where cast iron are just as good and several doodads that don't make the machine perform a bit better. After we get down to business and wipe out some of this unnecessary work we can probably set a price that will be attractive."

"You wouldn't make those changes, I hope, Mr. Johnson. The finished 'con' rods and the steel gears make great talking points. The fact is, I induced the old manager to put 'em in. The designer kicked a lot, said they were all bunk, but it helped me sell machines. All the others copied them after we put them in."

"We had an idea that it was a salesman's notion, Beasley. And I'm glad to know the designer objected. If the manager had shown backbone enough to stick by the designer, the old company might not have folded up. But it's a great temptation to pay too much attention to you fair-haired boys who do the selling. Those flossy con rods and the steel gear hurt the whole industry by adding unnecessary expense in all plants making these machines. It also hurt the users of the machines as it added to their cost of machine overhead."

"But don't you believe in good work, Mr. Johnson? I've always heard your motors well spoken of. You wouldn't cheapen your motors, I'm sure. And I can't sell these other machines if I have to admit they are not as good as they were before you took them over."

"Beasley, you're all twisted in your mind and in your adjectives. Of course we believe in good work. Always have and always expect to. And we aren't going to do a thing that will affect the real worth of these machines to the customer. Why do you suppose we use cast iron in the motor cylinder? Not because it's cheap but because it's better for that purpose. Airplane motors use steel because they have to keep the weight down but they'd all use cast iron if they could.

"It's the same with gears. We're going to use cast iron because it's a crime to use steel in that particular place. If we were cramped for space I'd use steel. But when there's plenty of room for large gears with a low-tooth load, cast iron can't be beat. So why use steel and have it cost us more and the customer more? And finishing those con rods all over is all bunk. In airplane motors it's O.K. on account of weight and to show up defects. But here the load is low and the danger of breakage is very little."

"But I've been selling high quality, Mr. Johnson, and I can't—"

"Mistaken again, Beasley. You've been selling hot air and not giving full value received. Would those con rods be any better if we gold-plated 'em? Of course not. They'd cost more but it would be a waste of money and they wouldn't be any better. It's just as much a crime to make things too expensive as too cheap. The user wants production and not frills.

"When I buy a machine I don't ask whether it has hardened gears, or scalloped legs, or a gold name plate. I ask what it will do—and how long it will keep doing it. I buy of a builder who has a real reputation for good machines so I know his guarantee means something. I don't care how much it weighs or how much it costs a pound. The plainer it is the better I like it. It's your job to sell machines as we build 'em on the basis of value to the user, and not because of any special doodad that you think make a good talking point."

"I'm afraid you don't appreciate the sales force, Mr. Johnson. We bring in the money, you know. No matter how good the design, we have to sell it. And we have to have talking points."

"The best talking point you can have, Beasley, is a good product at a reasonable price. We'll build this as we know it should be built and save the user money by cutting out unnecessary frills that don't help the machine a bit. We're always glad of suggestions and ideas, but unless there's some better reason than a talking point, we build it our way.

"We know you bring in the money. But you couldn't do it unless the designer and the maker gave you something good to sell. Don't try to minimize the importance of the shop end because even though you sold one machine solely by your sales talk, you'd never sell another if it didn't make good. The new machine will be as good or better than this one. It will be some cheaper because we can save expense in the making. If you can't sell a machine that costs less money than before and will earn more profit for the user, you are not the salesman I think you are. How about it?"

EDITORIALS

VOLUME 78 AMERICAN MACHINIST NUMBER 5

ESTABLISHED 1877

MCGRAW-HILL PUBLISHING COMPANY, INC.

K. H. CONDIT F. H. COLVIN

EDITORS

A Shorter Week

STILL convinced that the way to restore prosperity is to limit even further the output of each individual worker, the Administration is preparing to take another step in this direction. Organized labor's thirty-hour bill is in the House and hearings are being held by the House Labor Committee. But General Johnson has expressed the belief that an eight-hour day is a better unit than one of six hours. Informed opinion in Washington is that the thirty-hour bill will be held back as a threat, that the Code Authorities at their meeting on March 5 will be asked to accept a thirty-two-hour week, and that there will be a compromise at thirty-six hours.

In certain industries no great hardship will result from a reduction of hours to thirty-six or even thirty-two. In others, where there is already a shortage of skilled specialists, any further reduction in existing hours may result in hold-ups on key operations that will lead to lay-offs of operators on other jobs in the production line. Where such a possibility exists, the Code Authority of that industry should go to Washington armed with the necessary facts to prove the unwisdom of forcing men out of jobs by blanket restrictive measures.

For a clear analysis of the attempt to achieve recovery through spreading of work we commend the article by Ralph E. Flanders on another page. Mr. Flanders uses specific examples that will be readily understandable to any business man. And now, if ever, the business man is called upon to think clearly on a matter that has been the subject of much muddy thinking, in Washington and elsewhere.

Cards on the Table

IF THE FIRST move of the recently formed Special Tool, Die and Machine Shop Institute is typical of what may be expected from it there is reason to believe that it will occupy an important position in the metal-working industry.

In an open letter from its president to its customers this statement appears: "Our Institute, its trustees and its officers recognize fully the shortcomings within our own ranks, as they appear to you, our customer, and your representatives with whom our members come in contact in their business dealings, and we pledge you our whole-hearted cooperation toward improvement and gradual elimination of undesirable conditions." This is certainly a frank recognition of evils to be overcome and a courageous effort to take steps to right them in order that the Institute's NRA Code may be made to function.

In one respect this industry is unlike many of the others who have gone to Washington with their codes. It is made up almost entirely of small units. Some special machine shops are bigger than others, of course, but there is no General Motors or U. S. Steel giant among them. Dominance by one or two big interests is consequently not a problem.

On the other hand, the very numbers of the shops that come under the code definition make cooperation and coordination something to worry about. Starting off at its first annual meeting with five hundred members the Institute has a prospect list of over two thousand. In view of the strong individualism of the average proprietor of the kind of shop eligible to membership in the Institute the officers and trustees have a man's-size job on their hands.

But anyone who has managed to keep economically alive during four years of depression can hardly be daunted by such a task, for he has already conquered harder ones. All the moving spirits in this Institute have to do to achieve success is to maintain their frank, cards-on-the-table attitude toward the government, their customers and each other, and their battle is half won.

Key Men

INCREASED demand for automobiles and other products has proved the prophecy that skilled men would be found lacking when they were needed. There are probably two reasons for this difficulty that now faces several industries—failure to train enough men when business was normal and lack of appreciation of their value when panicstricken management began to reduce expenses.

Many of the old men are no longer available. Being of more than average intelligence they have been adaptable enough to place themselves in other lines of work, less subject to seasonal changes, and where personal ability was more appreciated. For, beside the loss of jobs there was a blow at the justifiable pride of the skilled workman at receiving little or no consideration when it was most needed.

Progressive management sees not only the need for training more men for key positions but also the

wisdom of a broader policy in handling them. Tool setters, maintenance men and others who hold the keys to economical production have seldom received sufficient reward for their services and their loyalty. Frequently a skilled operator of a semi-automatic draws a larger pay check than the man who sets up his machine and makes his work possible.

Many shops are having difficulties in getting back into production because their key men are no longer available. This makes code hours more onerous and prompts chiseling to the extent of giving such key men executive titles to enable them to work longer hours.

Key men are more important than special machinery. Management must find a way of looking after them in dull periods at least as well as it does the machinery which is dependent upon them.

.CHIPS.

Washington—By order of the President, Postmaster General Farley cancels air mail contracts . . . Army pilots take over the job of flying the mail and several casualties result . . . Reactions from all over the country indicate that the method of approach to this question marks the first Administrative action that has aroused as much protest as approval . . . Roosevelt favors open subsidy for shipping instead of mail contracts . . . Signs bill appropriating $950,000,000 for CWA and starts "tapering off" process at 10 per cent a week . . . Discusses with Governor Black of Federal Reserve the establishment of intermediate banks to handle industrial financing . . . Representatives of 44 states agree upon outlines of code for uniform state labor laws . . . David Lawrence would unite Democrats and Republicans who oppose the "New Deal" in a new political party, claiming Republican party is dead . . . PWA staffs start to dissolve as funds run out . . . Enough House members sign petition to force an early vote on soldier bonus bill although Roosevelt voices disapproval.

Foreign—France seems to be settling down under new cabinet but devaluation of the franc looks unavoidable . . . France and Great Britain jockeying for position in trade war begun by denunciation of commercial and navigation treaties . . . French Socialists and Communists put on relatively orderly 24-hour strike as warning against Fascism . . . Austrian troubles lead to pitched battles between Socialist workers and troops with many casualties . . . Threat to European peace is serious as Italy mobilizes troops . . . League intervention possible . . . Ranks of trade unions in Great Britain drop from 8 to 4 million . . . German standstill agreement renewed for one year . . . Excess of imports over exports worries the Nazis . . . Great Britain signs trade treaty with Soviets . . . King Albert of Belgium dies after fall from cliff and is succeeded by his son Leopold . . . British threaten South American countries with denial of London's loan facilities in effort to hold trade.

Finance—Campbell gold-hoarding case dismissed by Supreme Court . . . Treasury offer of $800,000,000 in 2- and 3-year notes heavily oversubscribed . . . Opposition to bill to regulate exchanges indicates that it will be modified before adoption . . . Whitney offers substitute plan . . . Bank deposits up as hoarding lessens . . . Temporary bank insurance to be extended for one year . . . Gold holdings rise as money comes in from abroad . . . Europa brings in $65,000,000 on hundred-million day . . . Export-Import Bank of Washington ready to function with $11,000,000 capital . . . Will confine its operations to Russian trade at first . . . Economists' National Committee on Monetary Policy reports its opposition to Roosevelt's monetary policy . . . N. Y. Central to float $60,000,000 loan, two-thirds privately underwritten, one-third RFC.

Industry—P. R. R. places orders for 15,000 tons of structural steel and 1,000,000 pounds of copper . . . Truscon steel orders double those of a year ago . . . Northwest Airways offers to sell out to Great Northern and Northern Pacific R.R.'s . . . Roosevelt requests that no change be made now in railroad wage rates . . . Pittsburgh & W. Va. asks I.C.C. permission to buy three freight locomotives . . . Russell Sage Foundation recommends socialization of mines . . . Pullman orders air-conditioning equipment for 19 cars from York Ice Machinery Corp . . . Consolidated Aircraft reports orders for training planes totaling 50 from China and Rumania . . . Chevrolet passes a production of 3,500 cars daily . . . Ford is at 4,000 and Plymouth is breaking its own records . . . Soft coal output up 11 per cent in January over December and 28 per cent over January, 1933 . . . Locomotive unfilled orders up to 80.

Trade—Price-fixing in retail code approved by Roosevelt . . . Department of Commerce reports January trade in rural areas 45 per cent ahead of last year . . . Retail trade in general is much better—40 per cent over 1933—despite damper of severe storms in East and North.

Indicators—Carloadings continue to rise . . . Output of electric energy 11.6 per cent ahead of corresponding week in 1933 . . . Business Week index recedes slightly to 66.4 . . . Steel production rises several points to 45.7.

Employment and Prices Chief Topics of Code Authority Conference

So great in scope has the March 5 to 8 meeting of the code authorities in Washington grown that it was found advisable to call a preliminary hearing of the public on February 27-28. This meeting, which followed the lines of the recent hearing on price profiteering, included testimony from management, labor and consumers, on the five main topics of the code authority conference itself, that is, employment, costs and prices, control of production and competition, code authority organization, and small enterprises and minorities. The real object back of this preliminary hearing was to get the mass of public attention and suggestions, which threatened to overwhelm the big conference, out of the way so that something can be done when the real show starts.

The March 5 meeting, which will be held in Constitution Hall, will be formally opened by President Roosevelt. Some 7,000 invitations have been sent but to all members of code authorities who will represent about 300 codes that have already been signed and to committees which have presented industrial codes not yet approved.

One of the big issues is to be price and cost determination. Leon Henderson, of the Russell Sage Foundation and a special advisor to General Johnson on consumer problems, is leading the fight in NRA against open price associations. Another issue is the cost of code administration and the systems of collecting money. Hundreds of protests have been coming into NRA over the assessments of the code authorities. An increasing number of the codes are providing for the purchase of labels, as in the garment industries, which pay for the privilege of stamping the Blue Eagle on their products. Others, like the construction code, require a registration fee to be paid to the code authority for every job, and the code authority will stop the work if the fee is not paid.

Division Administrator A. D. Whiteside, who is in charge of the pricing studies, will have a full report for the code authority conference, and it is hoped effective recommendations on this vital topic. Into this will also enter the problem of "What is cost?" which is giving much concern to industry and NRA. Shorn of its public fireworks, the code authority convention, it is hoped, will not be an unwieldy gathering. Those who urged that it be called three months ago look sadly on the trebling of the number of codes and code authorities during that time, with but little addition to the list of problems or to the suggested solutions.

With Congress considering a 30-hour week law and organized labor continuing its barrage for the reduction of working hours, NRA has been getting its statistics in shape to submit the whole question to the meeting of code authorities. General Johnson has clarified his earlier statement about the desirable working week being "multiples of eight" by pointing out that anybody who has shorter working time would prefer to have three continuous idle days to five or six days a week for a few hours each. He says that he has talked with hundreds of workers and they almost all say they would prefer four days of eight hours each to five days of six hours, or six days of five hours. He also holds that industry is geared to an eight-hour day and would prefer it that way. He finds that even with a 32-hour week as the ideal, there would not be the employment of 1926 by about 2,000,000. Critics of his plan point to the difficulty of working for short overtime periods with an eight-hour day, three days a week, hold that the 32-hour week is a decoy and that it will be 36 hours as a start with a flat ten per cent increase in the minimum wages set forth in all codes. Others believe that each industry will be considered separately.

Code Authority Approved for Tool Dealers

On February 23, General Johnson approved the method of election of the supervisory agency of the Machine Tool and Equipment Distributing Trade. Members of the agency are:

J. W. Wright, Colcord Wright Machinery & Supply Co.

J. Roy Porter, Marshall & Huschart Machinery Co.

Marshall Prentiss, Henry Prentiss & Co.

Stanley Motch, Motch & Merryweather Machinery Co.

W. S. Dyson, Hallidie Machinery Co.

C. E. Moore, Herberts-Moore Machinery Co.

G. H. Cherrington, Brown & Zortman Machinery Co.

• INDUSTRIAL REVIEW •

• With few exceptions industrial centers report continued improvement in business during February. Threat of a shorter work week, which many believe will come out of the NRA conferences in Washington during the next fortnight, is undoubtedly causing some buyers to hesitate, but if the curtailment does come it will stimulate the machinery market in the long run. An encouraging factor is the diversification of orders and the diminution of the supply of good used machines. Automobile plant orders and foreign orders, most of them for quick delivery, have slowed down deliveries in other territories.

• In the East spotty conditions prevail although most of the machine tool distributors are much encouraged by occasional substantial orders. Inquiries are strong. Pittsburgh reports relatively less activity than other districts, but some orders are being placed, mostly for special equipment. In Cleveland the slow but steady improvement characteristic of recent weeks continues.

• The situation is also improving in Cincinnati both for equipment and supply distributors. Inquiries are active. Indianapolis, too, is finding orders on the upgrade and with growing diversification. Used equipment is scarcer and new machinery is profiting thereby. A lull exists in St. Louis but it is looked upon as temporary.

• Automobile plants are getting into production in Detroit and as they do the market for supplies improves in proportion. Although the bulk of equipment orders is from the motor plants, and for specials, standard tools are moving and single orders from other than automobile plants are being taken. Chicago reports nothing spectacular, but an encouraging amount of business, nevertheless. Inquiries are particularly good. In Milwaukee things are also improving. February business apparently exceeded the January figures in most lines.

Machine Tool Orders Drop in January

While January orders for machine tools, as reported by 75 members of the National Machine Tool Builders' Association, had an index of 101.7 as compared to 128.6 for December, a reversal in trend is not indicated. The relatively high December index was influenced by an abnormally large volume of foreign sales which amounted to 54 per cent of the total. Foreign orders in January amounted to only 22 per cent. A better indication of the trend is obtained by a comparison to November's figure of 82.8 and that for January, 1933, at 36.1.

Shipments for January were at 62.9 as compared to 69.0 for the preceding month and 26.0 for January of last year. Unfilled orders were at a new peak of 206.9, whereas the backlog for December was 178.3 and that for January, 1933, 48.6.

The three-months' moving average of gross orders at 103.5 is the highest since October, 1930. Figures from 63 of the reporting concerns show that their indexes for January are divided between domestic and foreign as follows:

	Total	Domestic	Foreign
Gross orders	102.9	79.8	23.1
Cancellations	1.2	0.7	0.5
Net orders	101.7	79.1	22.6
Shipments	63.0	43.1	19.9
Unfilled orders	210.7	127.9	82.8

Senator Wagner Gives Labor Board Record

Since the National Labor Board came into being last August, and up to February 1, 1818 cases have come before it, involving 914,000 workers, according to a report submitted to President Roosevelt by Senator Robert F. Wagner, chairman of the board. Of these cases, 69 per cent have been settled, half of them by agreement. Altogether 650,000 workers have been put back to work or kept at work.

Senator Wagner claims settlement of 80 per cent of the 599 strikes brought before the board, besides averting 197 more strikes. Pending are 322 cases, involving 164,000 men. Regional boards have supervised 97 industrial elections, and have had 70 cases jointly submitted for arbitration. He finds in this record a cooperative attitude and desire for industrial peace on the part of a great majority of employers and employees. However, he believes that the percentage of settlements is too low and points out that some settlements have been unsatisfactory. Willingness to use the boards, displayed by the majority, is sometimes encountered by the impediment of a small minority, whose desire for industrial peace is not uppermost.

Symtomatic of this are the efforts of certain industrialists in challenging the board's authority. He believes it is significant that three-quarters of all the disputes involve complaints of denial of the right of self-organization and collective bargaining as provided in Section 7a of the Recovery Act.

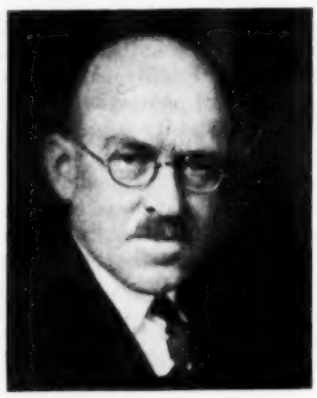
Samuel Seabury on Code Study Board

Working of the NRA codes of small industries is to be examined by a high-powered board including Clarence Darrow, Samuel Seabury and an influential group in industry, retailing and law. Senator Nye, who led the battle against NRA on Capitol Hill, nominated five of the six members, and General Johnson appointed them. The new group, probably to be called the Review Advisory Board, is to investigate monopolies and the oppression of small industries, which is specifically cited as one thing the codes cannot do, according to the Recovery Act itself.

Other members of the board, which met for the first time on February 26, just prior to the public hearing on codes, are Samuel C. Henry, until 1917 owner of retail drug stores, director of the Philadelphia Wholesale Drug Co. and from 1918 until 1933, editor and publisher of the *N.A.R.A. Journal* organ of the National Association of Retail Druggists; Fred P. Mann, Sr., retired merchant and former head of the Retail Merchants Association of the Northwest; W. W. Neal, hosiery mill operator; and John F. Sinclair, attorney, former banker and authority on finance and economics.

R. E. Flanders Leads Protest Against Shorter Hours

A drive against the economic fallacies which industrialists in general believe to be inherent in the plan of relieving distress by shortening hours was launched this week by Ralph E. Flanders, by an article in this paper (*AM*—Vol. 78, page 181) and by a series of advertisements of the Jones & Lamson Co., of which he is president. Mr. Flanders, who is a member of the Industrial Advisory



Board of NRA, will lead the discussion of the question at the code authority conference in Washington, March 5-8.

The analysis leads to an increased fixed expense for new equipment, a continuance of normal wage scales, but an increased employment at those scales and a large increase in production to be sold at present prices. Mr. Flanders finds many elements lacking for an optimum solution but looks to a revival, through a sound approach to the problem, of faith in a restoration of profits and confidence in the future, both of which are destroyed, he believes, by the proposal to shorten hours.

Metal-Working Code Hearings Scheduled

Date	Place	Deputy Administrator	Association
March 8	Commerce Bldg.	H. O. King	Malleable Founders
March 8	Commerce Bldg.	A. R. Glancy	Dairy Machinery Manufacturers (supplemental)
March 9	Raleigh Hotel	A. R. Glancy	Vitreous Enameled Ware Council (supplemental)
March 12	Commerce Bldg.	R. W. Murray	Air Valve
March 13	Commerce Bldg.	R. B. Paddock	International Stamp Manufacturers
March 13	Commerce Bldg.	R. B. Paddock	Traffic Control Signs & Signals Manufacturers
March 13	Commerce Bldg.	R. B. Paddock	Advertising Metal Sign & Display Manufacturers
March 14	Washington Hotel	K. T. Ammerman	Auto Rebuilders

Labor Conference Drafts Uniform State Code

Reaching further into social reform than ever contemplated under NRA, a uniform labor code was drafted and recommended for enactment by the 48 states at the conference which assembled in Washington recently at the invitation of Secretary Perkins. To assure coordinate action, regional conferences will be held semi-annually in the future for the discussion and adoption of interstate compacts.

The state code, drafted by eleven committees of state labor commissioners and union officials, has still to be elaborated in many of its specific provisions but includes the following proposals of fundamental scope:

Compulsory old age pensions beginning at 60 to 65 with $360 as the minimum including other sources of income.

Working hours, not in excess of 40 per week, for both men and women in all occupations except domestic service and agriculture. Prohibition against employment of women after 10 p.m. unless for a sufficient time to permit two legal shifts per day.

Unemployment insurance above the level of mere subsistence and extending over substantial periods of time. The conference indorsed the Wagner-Lewis bill under which employers contributing to unemployment reserves created by state law would obtain a rebate of a federal tax on payrolls.

Workmen's compensation defining injuries to include occupational diseases and recommending a state insurance fund, exclusive or competitive, to cover all industries and all employees, except possibly agriculture and domestic service.

Mandatory minimum wage for women and miners according to standard bill drafted by the National Consumers League and recently enacted by six states, and regulations prohibiting differentials for learners and miners or for localities or size of community; providing time and a half for overtime, a higher hourly rate for part-time workers and the minimum hourly rate to all piece-workers.

Child labor laws fixing the minimum age for leaving school at sixteen years and regulating employment between sixteen and eighteen years by making legal hours less than for adults; prohibiting night work between 7 p.m. and 6 a.m. and employment in hazardous occupations under eighteen years.

Health and safety protection assured by regular inspection to conform to nationally approved standards to cover ventilation, temperature, humidity, air space and lighting; dust, gases and fumes; dangerous materials and tools; fire protection; first aid, seating facilities; sanitary facilities; lunchrooms and drinking water.

Unemployment exchanges to be established in 23 states which have not yet accepted the provisions of the Wagner-Peyser act providing federal support and the regulation of private fee-charging agencies.

Collective Bargaining to Be Defined

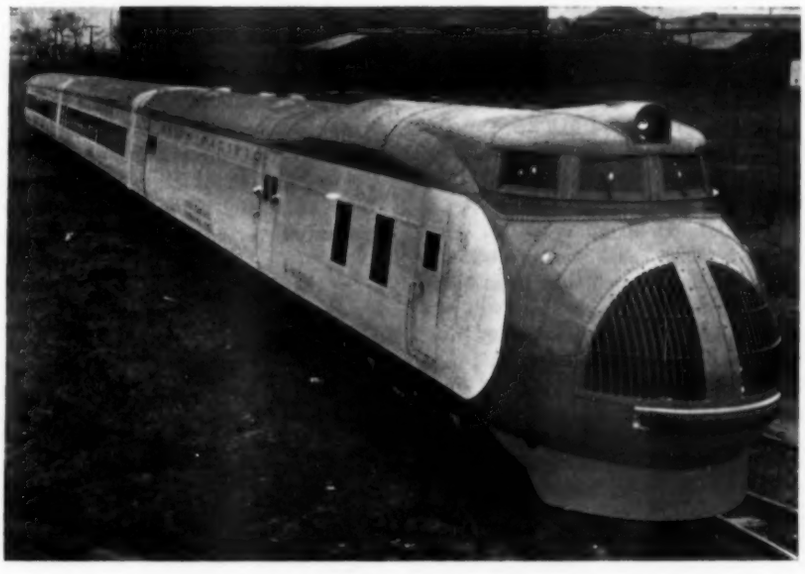
To put a legislative foundation under his National Labor Board and to settle the controversy on "what is collective bargaining" beyond further question, Senator Wagner has prepared a new bill. He holds that the naming of "representatives of their own choosing" according to Section 7a of the Recovery Act is the job of the workers, not of the employers, and he wants the National Labor Board to supervise any elections the workers hold to that end. The bill also makes clear that when the workers vote they are bound by majority choice; it may be that if groups refrain from voting they have a claim on minority representation, but the Senator would like to get them all together. The bill seeks to settle what a minority is.

Dr. Stillwell to Receive Lamme Medal

"For his distinguished career in connection with the design, installation and operation of electrical machinery and equipment," Dr. Lewis B. Stillwell, consulting engineer of New York, has been awarded the 1933 Lamme medal of the American Institute of Electrical Engineers. Presentation will be made at the summer convention of the institute at Hot Springs, Va., June 25-29.

Dr. Stillwell was an outstanding leader in the development of alternating current, and from 1886 to 1897 when with the Westinghouse Electric & Manufacturing Co., he had an active part in determining that company's engineering development in this field. From 1897 to 1900 he served as electrical director of the Niagara Falls Power Co.

A member of the A.I.E.E. since 1892, Dr. Stillwell has been active in committee work and the author of several important technical papers. He was president of the institute 1909-10 and vice-president of the American Engineering Council for four years, to 1933.



***Streamlining Reaches the Railroads*—Capable of a maximum speed of 110 miles an hour, the new Union Pacific "Tomorrow's Train" is shown in the yards of the Pullman Car & Manufacturing Corporation at Chicago. Its 600-hp. Winton engine drives a directly connected generator. Three cars built of aluminum alloy together weigh only as much as a single Pullman sleeping car of old construction**

Prospects Good for Tool Trade With U.S.S.R.

Moscow—Prospects of the American machine tool industry for trade with the Union of Socialist Soviet Republics in the next few years are excellent, for thousands upon thousands of new machine tools will be required to fulfill the program of the second Piatiletka. While U.S.S.R. will supply her own needs in increasing measure, the major share of it must still come from abroad. The bulk of this business should go to America.

In the automotive industries alone, the second Piatiletka will witness the erection of many new plants and the enlargement of others. All of these projects are looking to America for a considerable share of their equipment. In Stalingrad on the Volga, right alongside of the famed tractor plant, will be erected a new plant scheduled to produce 100,000 three-ton trucks yearly. In Ufa, in the Urals, a duplicate plant will be erected with equal production facilities. These are no mean projects. Then, both in Yaroslav and Samara—widely remote from each other—will be erected modern factories for producing five- to twelve-ton trucks at the rate of 25,000 yearly in each place. This will mean some heavy machine tools, forging and foundry equipment.

Amo, in Moscow, is to be reorganized and enlarged to produce yearly 70,000 trucks and 10,000 passenger cars. The present capacity of this plant is 20,000 trucks yearly but no passenger cars. The Gorki plant at Nijni-Novgorod is to be reorganized and enlarged for a yearly production of 300,000 Ford Model A type passenger cars.

This is only one branch of the planned national economy. The prospects in the oil, coal, mining and railroad industries are such that large quantities of mechanical equipment will also be used there. Railroad facilities must be expanded greatly and at a rapid rate, but no attempt will be made to build heavy locomotive machine tool equipment here, now or in the near future.

There is an intensive campaign now being waged in the entire national press for the better utilization of imported machine equipment. Reports keep coming in showing sections of various industries using in some cases only a fraction of the imported machinery available because of a lack of operating knowledge. This is directly traceable to the absence of instruction books either in Russian, in the original foreign language or in both. Much machinery is also being wrecked through improper operation from the same cause.

This merely emphasizes the necessity, in making a bid for Soviet business, for American machine tool manufacturers to provide instruction books and to set up data in Russian as many European firms are now doing in an earnest effort to maintain their trade positions.

Foundry Equipment Orders Fall in January

Gross orders for January had an index of 37.2 as compared to 43.8 for December and 68.4 for January 1933, according to the report of the Foundry Equipment Manufacturers Association. Shipments were at 33.4 for last month as against 38.2 in December and 23.2 a year ago. Unfilled orders for January were also off slightly with an index of 33.8. The figures for December and January of last year were 35.2 and 58.5 respectively. Three months' averages of gross orders were 39.2 for January 1934, 41.0 for December 1933 and 33.5 for January 1933.

A.S.T.M. to Hold Metallic Coating Symposium

A feature of the regional meeting for 1934 of the American Society for Testing Materials will be a symposium on the outdoor weathering of metals and metallic coatings. This will be held in Washington, at the Wardman Park Hotel on March 7, in conjunction with the standing committee meeting March 5-9.

In charge of the symposium will be F. F. Farnsworth, chairman, outside plant engineering, Bell Telephone Laboratories, Inc.; W. H. Finkeldey, metallurgist, Singmaster & Breyer; C. L. Hippensteel, technical staff, Bell Telephone Laboratories, Inc.; R. F. Passano, research laboratories, American Rolling Mill Co.; H. S. Rawdon, chief, Division of Metallurgy, U. S. Bureau of Standards, and Sam Tour, vice-president, Lucius Pitkin, Inc.

Four technical papers will be presented and opened to discussion:

1. Outdoor Test Results on Bare Metal-Coated Ferrous Specimens—C. D. Hocker, chemical engineer, Bell Telephone Laboratories, Inc.

2. How Soon Is It Safe to Draw Conclusions?—A discussion of the early interpretation of test results in the atmospheric corrosion of non-ferrous metals and alloys—W. H. Finkeldey.

3. Galvanic Corrosion by Contact of Dissimilar Metals—C. L. Hippensteel.

4. The Harmony of Outdoor Weathering Tests—R. F. Passano.

At a dinner following the symposium, the following men will present short addresses: Willard T. Chevalier, Publishing Director, *Engineering News-Record,* toastmaster; Lawrence W. Robert, Jr., assistant secretary of the Treasury, in charge of procurement and miscellaneous; Capt. C. A. Jones, head of the design division, Bureau of Engineering, Navy Department; Dr. Robert A. Brady, special advisor on consumers' standards, NRA, and assistant professor of economics, University of California.

Export Bank to be Used for Russian Orders

Russian orders, whose imminence has been given as the reason for rapid action on the new Export-Import Bank of Washington, are reported to include steel for completing the double-tracking of the Trans-Siberian Railway (1500 miles), something over 1,000 miles of pipeline, from the Caucasian oilfields to the industrial centers of Russia, and a considerable quantity of machine tools and machinery of various sorts. The plan for financing these reputed orders will lie with the EIB which will have a definite fund in addition to its $11,000,000 of capital to handle these transactions. The transfer of money will not be a problem, as it will not leave this country but will be paid to American manufacturers and shippers of agricultural products, including cotton and fats, or rather used in the form of guarantees of the bills. The bargaining basis by which the EIB will dicker with shippers in order to have the government take the credit risk only on such part of each shipment as the shipper can show he cannot handle has not been changed, although the only criticism of the plan by exporters was that this dickering procedure would work hardship on many shippers and give unfair advantage to others.

Asked how long the new EIB would be in effect Chairman Jesse Jones, of the Reconstruction Finance Corporation, which is furnishing the money, said "probably at least as long as we live." Every field of export and import activity will be explored, and every application for credit facilities will be weighed both for capital goods and for agriculture. The criterion will be more jobs and more industrial activity for the United States.

Metal Products Code Authority Recognized

NRA Administrator Hugh S. Johnson recently extended official recognition to the executive committee of the Fabricated Metal Products Federation as the code authority for the Fabricated Metal Products Manufacturing and Metal Finishing and Metal Coating industry. Elected to serve until October next, its members are, H. S. Kimball, Washington, D. C., D. S. Hunter, Cleveland, Ohio, H. S. Blake, New York City, H. R. Naylor, Seymour, Conn., E. A. Thatcher, Chicago, Ill., A. M. Ferry, Washington, D. C., H. G. Donham, Boston, Mass., H. D. North, Cleveland, Ohio, W. M. Goss, Waterbury, Conn.

Code Hearings Cancelled

Code hearings, with few exceptions, scheduled between February 27 and March 8, inclusive, were ordered cancelled by General Johnson. This step was taken to leave all deputy administrators and other officials free to devote their entire time and attention to receiving and studying the great mass of criticisms and suggestions that will be developed in the public meetings on NRA affairs which started February 27, and the national conference of code authorities which will open March 5. A large attendance is expected at these meetings, the Pennsylvania Railroad alone reporting that 2,000 reservations had been placed with it for transportation to Washington. Three of the leading hotels at the capitol are sold out for this period. Messages from individual industrial leaders, officials of organized business and consumer groups, and from ordinary citizens, express their desire to participate in these meetings.

Administration Members Appointed to Code Authorities

In accordance with the NRA policy of relieving deputy administrators from service on code authorities, Administrator Hugh S. Johnson recently announced the following new appointments in divisions of the metal-working industry.

Laundry and dry cleaning machinery manufacturing industry — Robert L. Houston, formerly vice-president of the International Business Machine Corporation, to succeed George S. Brady.

Boiler manufacturing industry — James W. Hook, president, Geometric Tool Co., to succeed Neal W. Foster.

Grinding wheel industry—Charles R. Baxter, formerly U. S. Army Ordinance Department to succeed A. C. Cook.

Coated abrasives industry—Frank E. Seeley, formerly vice-president and general manager of Abendroth Brothers, to succeed A. C. Cook.

Printer's rollers industry—Cleon R. Johnson, formerly of the Goodyear Tire and Rubber Co., to succeed Neal W. Foster.

Textile machinery manufacturing industry—Cleon R. Johnson to succeed George S. Brady.

Packaging machinery industry—Alfred E. Waller, formerly of Ward Leonard Electric Co., and managing director of NEMA to succeed George S. Brady.

Shipbuilding and ship repairing industry—Arba B. Marvin, New York attorney to succeed William H. Davis.

Gas cock industry—Oscar Grothe, vice-president, White Sewing Machine Co., to succeed George S. Brady.

Anti-friction bearings industry—Robert L. Houston to succeed Neal W. Foster.

Buff and polishing wheel, and buffing and polishing composition industries—Richard L. Ahearn, formerly vice-president of the Western Waterproofing Co., to succeed Neal W. Foster.

In each case the retiring administration member has not resigned from NRA but has retired only from administration membership on a particular code authority. Other appointees are:

Printing equipment industry and trade—Robert L. Houston.

Refractories industry—Harry C. Carr, formerly of the Gulf Oil Corporation and the Sun Oil Co.

Gear manufacturing industry—Walter W. Tangeman.

Counter ice-cream freezer industry—Lester Kintzing.

Foundry equipment industry—Oscar Grothe.

Exports of Machinery During 1933

	1933	1932
Electrical machinery and apparatus	$43,580,279	$43,381,834
Power generating machinery (except automotive and electric)	3,845,347	4,994,357
Construction machinery	2,812,681	3,825,398
Mining, well and pumping machinery	13,503,931	10,570,575
Power-driven, metal working machinery	8,157,791	12,023,027
Other metal-working machinery	1,211,162	1,843,977
Textile machinery	4,859,683	4,315,476

Exports of Metal-Working Machinery During 1933

	1933	1932
Engine lathes	$360,439	$651,325
Turret lathes	206,241	92,976
Other lathes	169,354	430,325
Vertical boring mills and chucking machines	114,493	403,618
Thread-cutting and automatic screw machines	366,252	260,589
Knee and column type milling machines	261,552	325,428
Other milling machines	421,480	664,471
Gear-cutting machines	606,598	678,576
Vertical drilling machines	158,207	157,717
Radial drilling machines	69,317	117,789
Other drilling machines	296,715	526,838
Planers and shapers	103,930	194,040
Surface grinding machines	205,793	130,710
External grinding machines	291,434	348,859
Internal grinding machines	227,434	375,186
Tool grinding, cutter grinding and universal grinding machines	273,435	283,123
Other metal-grinding machines	255,423	548,969
Sheet and plate metal-working machines	891,765	2,164,433
Forging machinery	341,500	810,881
Rolling mill machinery	253,532	425,725
Foundry and molding equipment	448,047	342,924
Other power-driven metal working machinery and parts	1,734,850	2,088,525

Other Metal-Working Machinery

	1933	1932
Pneumatic portable tools	$281,615	$350,043
Other portable and hand or foot operated metal-working machines and parts	326,735	386,531
Chucks for machine tools	57,343	38,233
Machine-operated pipe and thread cutters, stocks, dies, taps and other machine-operated tools	319,987	744,157
Other metal-working machine tools	225,482	325,013

• BUSINESS ITEMS •

The Whitehead Stamping Company, 161 W. Lafayette St., Detroit, Mich., is the new name of the Kales Stamping Co., according to a recent announcement. Company officials stated that the change of name does not affect the policies of the company or the personnel. The company was organized in 1904. Officers are J. Frazer Whitehead, president; Thomas C. Whitehead, vice-president, and George W. Schreck, secretary.

The Landis Machine Co., Waynesboro, Pa., announces that its Victor

Plant, also located at Waynesboro, will henceforth be known as the Landis Machine Company, Tap Division. This change in name has been brought about by the fact that the new line of collapsible taps recently placed on the market will be known as "Landis Collapsible Taps." Manufacture of the older line of Victor taps has been discontinued.

FRANK SWIHART, receiver for the Portable Power Tool Corp., Warsaw, Ind., has been empowered by the circuit court to continue operation of the company.

Ingersoll-Rand Co., 11 Broadway, New York, N. Y., has acquired the turbo-blower business of the General Electric Co., and manufacturing equipment of the latter is being moved to the Ingersoll-Rand plant at Phillipsburg, N. J.

The Dayton Malleable Iron Co., Dayton, Ohio, has acquired the business and equipment of the Elite Manufacturing Co., Ashland, Ohio, manufacturer of automotive jacks and equipment, and will remove the equipment to Dayton.

J. W. MULL, JR., manufacturers' representative of production tools at Indianapolis, Ind., has appointed M. THOMAS KNOTT as manager of the Pittsburgh, Pa., office. This office was recently moved from 505 Berger Bldg., to 1302 Clark Bldg. Mr. Knott was formerly with the Motch & Merryweather Machinery Co., of Pittsburgh.

At the annual meeting of the stockholders of the E. F. Houghton & Co., Philadelphia, the following officers were elected: LOUIS E. MURPHY, president; AARON E. CARPENTER, first vice-president and general manager; A. E. CARPENTER, III, secretary.

At the annual meeting of the Perkins Machine & Gear Co., West Springfield, Mass., the following officers were elected: COL. B. A. FRANKLIN, chairman of the board; JULIAN L. PERKINS, president; JAMES A. PERKINS, vice-president; JOHN OAKLEY, vice-president and DR. EDWIN C. GILBERT, general manager. FREDERICK H. RICH, who joined the company in 1927, was appointed general manager in 1931 and was also assistant treasurer, is no longer connected with the company.

The Allis-Chalmers Manufacturing Co., has removed its Buffalo, N. Y., district office to the Liberty Bank Bldg. A. D. BROWN is district manager.

The R. G. Haskins Co., Chicago, held a demonstration of its high-speed tapping equipment at Rockford, Ill., on Feb. 7. Over 150 plant superintendents and other officials attended, and sample parts of Rockford manufacture were tapped. Demonstrations will be held in South Bend, Ind., and Syracuse, N. Y., besides other industrial centers.

The Westfield Manufacturing Co., of Westfield, Mass., has been organized as a subsidiary company of the Torrington Co., Torrington, Conn., and has purchased the assets of the Westfield Mfg. Co., a pioneer manufacturer of bicycles. The new company will continue production at Westfield. Officers are: E. H. BROADWELL, president; N. R. CLARKE, vice-president, and GEORGE R. DELEARIE, treasurer.

• OBITUARIES •

JOHN W. BATE, 70, Racine industrialist and president of the Racine Industrial Co., the Rex Accessories Co. and the Badger Mfg. Co., died Feb. 24.

WILLIAM M. BLACKSTONE, president of the Blackstone Manufacturing Co., manufacturer of washing machines, and a director of the Jamestown Malleable Iron Corp., died February 16 at Jamestown, N. Y.

EDWIN C. BROWN, 65, chairman of the board of the United States Shoe Machinery Corp., Boston, died February 8 at Palm Beach, Fla. He joined the company in 1900 and rose to the presidency in 1917, but resigned this office in 1927.

ERNEST W. GILMAN, 66, since 1912 vice-president and general manager, Ingersoll-Rand Co. of Canada, Ltd., Montreal, died Feb. 20.

FREDERICK H. LUTZOW, president and engineer of the Western Bearings Co., Chicago, died February 17 at the age of 58. Mr. Lutzow formed the company in 1919. He was a member of the National Metal Trades Association and the Illinois Manufacturers Association.

GEORGE W. MCILRATH, plant superintendent of the Gabriel Co., Cleveland, manufacturer of automobile accessories, died Feb. 16 at the age of 50.

JOHN RAPHAEL ROGERS, in charge of the experimental department of the Mergenthaler Linotype Co., died January 18, at the age of 77. In approximately 45 years he took out between 400 and 500 patents on typesetting machinery. He had been associated with the Mergenthaler Co. since 1903.

CLAUDE ROBERTS SHAFFER, 58, president until his retirement last August, of the John Lees Co., Indianapolis, metal stamping company, died recently.

CHARLES H. SHEASLEY, 70, president of the Franklin Valveless Engine Co., Franklin, Pa., and a director of the Macy Engineering Co., maker of aircraft controls and stabilizers, died February 13.

• PERSONALS •

JOSEPH F. GEERS, president of the Index Machinery Corp., Cincinnati, Ohio, sailed on the *S. S. Deutschland* on February 22 for Germany, where he will visit the annual machinery fair at Leipzig. He will return to Cincinnati about May 1, and he expects to bring back special machines not built in the United States.

H. S. COVEY, secretary, the Cleveland Pneumatic Tool Co., has retired. He is succeeded by A. M. BARNER.

J. H. GREENLAND is now in charge of manufacturing at the Chain Products Co., Cleveland. He was formerly connected with the Iron Fireman Mfg. Co., at Cleveland.

EDMUND W. MILLER, assistant manager of the Indianapolis Branch of the Crane Co., manufacturers of plumbing and heating supplies, has been made manager. HORACE R. RIGGS has been made assistant to Mr. Miller.

PAUL J. MYLER, president of the Canadian Westinghouse Co., Ltd., Toronto, Canada, was recently elected chairman of the board, succeeding the late H. H. WESTINGHOUSE. Mr. Myler will continue to be president.

CHARLES M. NIEZER has been elected president of the Tokheim Oil Tank & Pump Co., Fort Wayne, Ind. He succeeds CLAYTON O. GRIFFEN, who retired recently.

S. A. WOODMANCY has been appointed manager of the gear and axle plant of the Chevrolet Motor Co., at Detroit. Mr. Woodmancy was formerly manager of the transmission plant at Toledo.

• MEETINGS •

AMERICAN SOCIETY FOR TESTING MATERIALS. Regional meeting—symposium on outdoor weathering of metals and metallic coatings, March 7. Wardman Park Hotel, Washington, D. C. Annual meeting, June 25-29. Chalfonte-Haddon Hall, Atlantic City, N. J. A. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

OIL BURNER SHOW. Eleventh national, March 5-9. Commercial Museum, Philadelphia, Pa. HARRY F. TAPP, executive secretary, American Oil Burner Association, 342 Madison Ave., New York, N. Y.

WELDING CONFERENCE. Third annual, Feb. 28-Mar. 1. Sponsored by department of industrial engineering, Ohio State University, Columbus, Ohio. Communicate with O. D. RICKLY, assistant professor of industrial engineering.

American Machinist
REFERENCE BOOK SHEET ©

Screw Machine Work

Pullouts for Drills—II

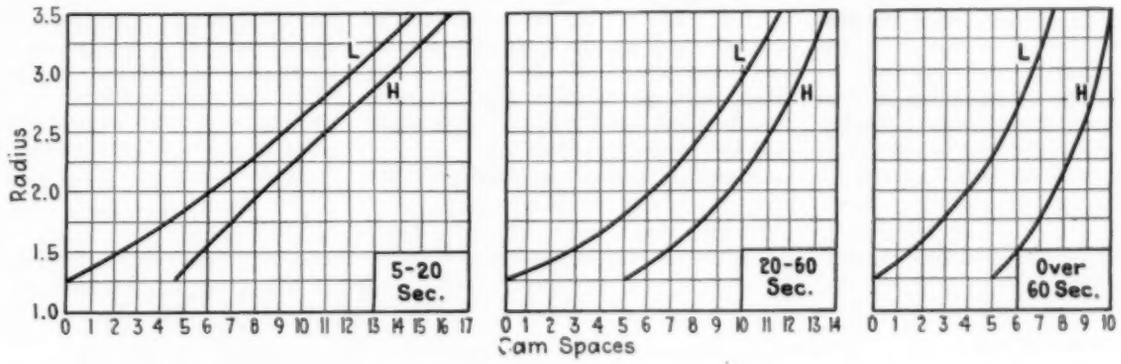
An earlier Reference Book Sheet (*AM*—Vol. 77, p. 661) gave charts for finding the pullouts for drills when considering the B. & S. No. 00 automatic screw machine. The charts reproduced on this page through the courtesy of the Banner Manufacturing Company, Chicago, are for use with the No. 0 and No. 2 machines.

It is often necessary to have one drill enter the work farther than its recommended depth. So that the job may run without trouble, pullouts are usually provided for in the cams so that the drill will feed in for a distance of three or four times its diameter and then drop back sufficiently to clear the tip and wash away the chips. The cam then advances the drill to the cutting position and the hole is drilled deeper.

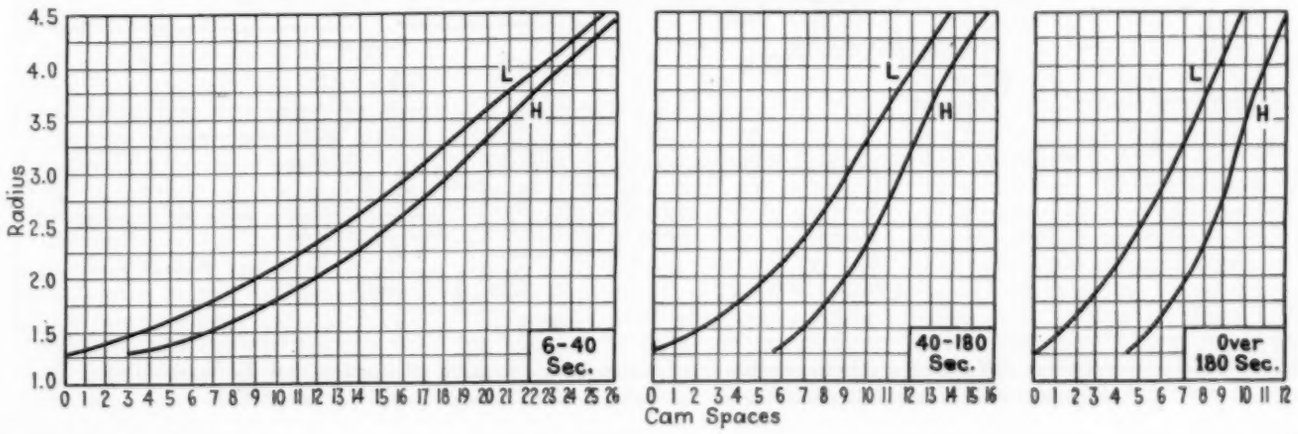
When determining the cam spaces required for pullouts, it has been customary to draw that portion of the cam on either a blank or a layout sheet and to count the number of cam spaces needed. To obviate drawing up each job the charts shown were developed. The only data needed are height of lobe before the pullout, the lowest radius of the pullout, and the estimated running time of the cycle to make use of these charts.

Example: Assume a job on the No. 0 machine, a cycle of 40 sec., a height of lobe before the pullout of 2.5 in., and that the drill drops back ½ in. Refer to chart for the 20-60 sec. cycle. Follow line L to lowest radius of pullout, or 2 in. (2.5 in.-0.5 in.). The corresponding number of cam spaces is 6. Follow line H (height of lobe before pullout) to ordinate of 2.5 in. The corresponding number of cam spaces is 11. Subtracting L from H gives 5 cam spaces, the number required for the pullout.

Charts for Drill Pullouts on B. & S. Nos. 0 and 0G Screw Machines



Charts for Drill Pullouts on B. & S. Nos. 2 and 2G Screw Machines



Toolholders and Tools for Planers and Lathes

WILLIAM C. BETZ
Master Mechanic, Fafnir Bearing Co.

Modern metal-cutting requires that both the machines and the toolholder equipment shall be rigid to prevent vibration and chatter.

A rigid toolholder for the planer or shaper is illustrated in Fig. 1. It is attached directly to the clapper and has an abutment to bear against the bottom of the clapper. Such a toolholder may be made to hold a number of toolbits, either straight, as at *A*, or at an angle, as at *B* and *C*. With straight toolbits, roughing and finishing can be done at one pass by using two toolbits for roughing and one for finishing, each toolbit being set for a given depth of cut. With toolbits set at an angle, right- or left-hand interior corners and shallow dovetails can be machined.

A keyseating tool for the planer or shaper is shown in Fig. 2. The holder or bar for the toolbit is held in the clapper, taking the place of the regular toolpost. A tool of this kind gives best results when fed upward, since all slack between the threads of the screw and the nut is taken up.

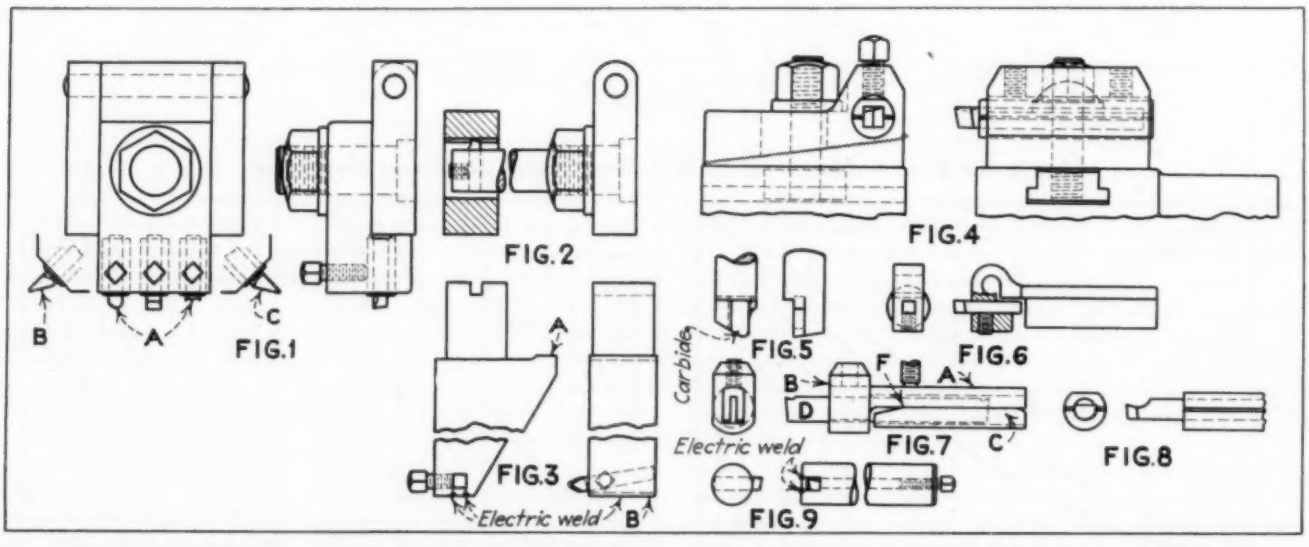
The toolholder shown in Fig. 3 is for use in a vertical boring mill of the turret type. Such a holder is very rigid when boring work of large diameter. Its main features are the bearing spot *A*, which rests against the turret face and takes the thrust of the cut, and the method of making the square hole for the toolbit. A slot, deeper than the thickness of the toolbit, is milled in the holder and is closed at the bottom by welding in the keeper *B*, leaving a square hole.

A very rigid combined toolholder and tool is shown in Fig. 4. Adjustment for height is made by sliding the upper block on the lower one, both blocks being machined at an angle and serrated to prevent slippage. The toolholder is attached to the compound rest, as shown. The toolbit is held in a two-piece bushing that is hardened and ground all over. The holder can be used for holding toolbits of Stellite or super high-speed steel. There is no danger of breaking such friable tools in clamping, because they have a flat bearing in the bottom half of the bushing. Tools having carbide tips, as in Fig. 5, can be used in this holder, also the spring tools for threading and cutting off, as in Figs. 6 and 7. By turning the toolholder so that the hole for the bushing is parallel with the shears of the lathe, boring tools, such as shown in Figs. 8 and 9, can be used directly in the holder, taking the place of the bushing.

Special attention is called to the spring holder for the cutting-off tool in Fig. 7. The upper part *A* of the shank is semicircular in section and has the clamping head *B* as an integral part. The lower part *C* of the shank is also semicircular in section, and the slot for the lower part of the blade *D* is deep enough so that the upper part of the shank can spring downward at least $\frac{1}{8}$ in. without danger of breaking the blade. If it is desired to use the tool as a solid tool, the bottom part of the shank can be turned end for end. Both the angle and the clearance are somewhat exaggerated to illustrate the spring action. The tool can be used for threading by grinding the end of the blade to the correct angle. For cutting threads of coarse pitch, the holder can be swiveled in the hole in the toolblock.

Rail-Air Express Service

Air passenger service has become so common that it is no longer news. But few of us realize to what extent express matter is being sent by air. As an example the Waterbury Farrel Foundry & Machine Co. of Waterbury, recently put a 47-lb. shipment on the train at 5 P.M. which reached Newark, N. J., 126.6 mi., at 9:17. This was rushed to the airport to catch the 10:30 plane and landed in Chicago at 4:27 the next morning, a total of 856.6 mi. And who of us knew that Dr. Eckner carried a boxed grand piano on the Graf Zeppelin clear round the world on his memorable flight? It was intended for a customer in Tokio but as no landing facilities had been provided, the piano continued on its globe girdling trip. Air express—frequently aided by the railways—is likely to grow in favor.



No matter how powerful and rigid the machine, it is essential for modern production that the toolholding equipment be as rigid as possible, for no chain is ever stronger than its weakest link

THE ROUND TABLE

No Inventory

"Say, Al, what'd you mean when you said you didn't take any inventory down at your place?"

"I didn't say, or I didn't intend to say, that we didn't take inventory. I meant that we didn't take an annual inventory."

"That's the way I understood it. I thought you might tell Williams how you do it and get him to cut it out. I don't like Sunday work."

"But you haven't any trouble. One place I worked they used to close down for two weeks. I worked at another place where they cut the shutdown to one week. When I went to work for Williams the plant was busy, and he didn't shut down at all. He took inventory over Saturday and Sunday. He was the first man I knew of to do that. So you're lucky in comparison with lots of foremen."

"Maybe, but I'd be luckier if we didn't take inventory at all. How do you work it, just guess at it?"

"My telling wouldn't help you much, Ed. Your factory and mine are two different breeds of cats."

"Oh, I don't know. We're not so far behind. You used to think that Williams was a pretty good super, one time."

"I do yet, he's one of the best. I didn't mean it in that way. NRA hasn't found it out yet, but there's two distinct types of manufacturing. Mine is one kind and yours is another. After things in my factory are once started they don't require any further attention. I can plan once for all. You have to plan for every job, and have complications I never hear of. Williams' job is a lot bigger than mine, and a lot harder. I make the same thing all the time and every order you get is different in size and nature. See what I mean?"

"Not altogether; I can see the difference, but it's all manufacturing."

"Take an automobile factory, for instance. It makes the same thing all the time. The wheelbase and the style of body and paint may vary, but all the automobiles require the same processes and the same materials. I do the same thing. I manufacture a few sizes of compressors and pumps, but they are all the same type and use the same materials. I know what the economic quantity of each part is, and I place enough in the shop to keep the men busy without regard to sales. The total of piece-part times must equal the total man-hour time. It requires just so much. If you have less, your men are not busy; if you have more the shop can't digest it. Do you get that?"

"I think so, go ahead."

"When you get the right amount of operating material in the shop, there's only one way to keep it right, and that is to watch your output and put into production the exact number of parts that are used in finished assemblies that have passed test. If you do that, you will always have the same number of parts in the shop. Not every day, of course, but during a turnover cycle."

"Seems to me that doing such small lots would be expensive."

"You don't machine small lots. You figure how long it will take to use an economic machining lot and put each part into production at that time. It might take eight weeks to use up an economic lot of frames; well, every eight weeks the exact number of frames that have been assembled and passed test are re-ordered. The same with every part. The number ordered may vary, but the interval at which the orders are placed does not. Furthermore, your inventory is balanced. You have just enough parts to make so many complete assemblies. Not too many of one part and too few of another."

"Admitting you're right, which I don't, why can't we do the same thing?"

"You can't because the same parts do not repeat themselves. Furthermore, you have to carry a large assortment of sheet metal, bar stock and bolts, for which you have no order. You can't send material into the shop at fixed times; you must use it when you have machine capacity. I can plan once for all, and you must plan every job."

Can Al get along without an inventory? Is he correct in saying that Ed's firm cannot follow his example?

Discussion

Unions or NRA?

It must be granted that individuals have the right to organize for protection and for the promotion of their interests. Therefore it is logical that unions, as well as trade organizations, are a fundamental requisite of our national life. Unions have done much toward raising the standard of living of the workers, but they have not kept pace with economic developments. NRA and the Labor Board would not have been necessary had the unions been equal to the tasks allotted to them.

Trade schools, having courses that would supplement the daily work of apprentices, should be established in various parts of the country, subsidized by unions at large and by the government. Unions have a place in things and a golden opportunity is knocking at their doors. Should they do the right thing now, their membership will increase

yearly. If not, they are doomed to replacement by some other form of organization that is founded on broader principles. —HAROLD L. WYNN,
Executive Engineer,
Pacific Electric Mfg. Corporation.

Averaged Dividends?

Al's plan for averaged bonuses to his men is good if we can assure steady employment. If the same men are with him year after year, it is a fine scheme. If, however, he has to lay off some of his men, they lose out on the benefits of the averaging.

In a busy year the men may have to work harder, perhaps overtime. If they are laid off and get jobs in other cities they lose the extra bonus they have earned, this being passed on to make up the average for the next year. Of course it averages up in community purchasing power, but it puts a crimp in the idea of rewarding individual initiative, that most of us have thought necessary.

The chances are, however, that the average worker would rather pass up the possibility of a big bonus one year and prefer a fairly uniform bonus every year. —FRANK C. HUDSON.

The ideal of building up a reserve in good times so that dividends can be continued out of surplus in times of depression is an old ideal. It was carried into effect in the present depression to a greater extent than ever before, and the result on business as a whole was not good. The large reserves in the form of bank deposits and security holdings enabled many business organizations to maintain their dividend payments during 1930, 1931 and even 1932, when the business was showing a net loss. It is my opinion that this practice was quite an important contributing factor in increasing the severity of the depression.

Consider for a moment how such a reserve acts. It must be invested in some form, usually in either bank deposits or securities. When the reserve in bank deposits was called for, the banks found it necessary to demand payment from those to whom they had loaned the money. This added to the financial difficulties of the debtors and caused a further recession of business. And finally, the calls for bank deposits, both for dividends and other purposes, became so great that the banks could not collect the debts to them fast enough and were forced to close. The use of the reserves in the form of security investments made it necessary to sell the securities when others were also selling theirs. It added to the demoralization of the securities markets.

We should recognize that "averaged dividends" requires a reserve, and it requires that this reserve be called for at the same time that others are calling for theirs. It means a demand for payment of debts at the time when it is most difficult for the debtors to pay. This is closely related to the "debt-deflation" theory, which Prof. Irving Fisher has been claiming to be the chief cause of major depressions. I am inclined to doubt whether it should be called the chief cause of the depressions, but certainly this consumption of reserves by many people at the same time does add seriously to the severity.

—A. W. FORBES,
Forbes & Myers.

Uniform Accounting

Uniform accounting is practicable, especially in the small tool industry, but some method would have to be used to make firms keep to the system after all the ideas and prices had once been revealed. There would be pirates and traitors. How would the unscrupulous be prevented from joining the consenting firms and then, after seeing and hearing enough, resigning and rushing away to undercut?

Is it reasonable that a knowledge of costs will prevent uncontrolled price cutting? No; it would rely entirely on the honesty of the firms concerned. There is not enough honesty to go around. The small firms, unless extremely specialized, would be swamped by the larger capitalized firms able to install a great number of labor-saving machines. Competition would be ruled out except for quality and quick delivery.

Then, when all firms became equally competent, the directors' influence would get to work. A firm quoted for a quantity of ordinary screw cut taps. The customer sent back a list of another firm quoting thread ground taps at half the price, in fact not much more than the steel would cost to the first firm.

A step in the right direction would be for competing firms to decide upon a minimum price for standard tools.

—W. A. HARRIS,
Coventry, England.

Human beings are not made uniform and they properly rebel when anyone attempts to put them in a uniform. Uniform costing is impossible. Local conditions vary, and as costing is a tool of management, the manager must be free to decide how to get his costs. This is my experience, strengthened by many years of control in many trades. But plain experience of uniform costing also shows that I am right.

Once, I investigated the costing of every manufacturer of woolens in a certain country. All made the same, bought the same material, paid the same price for it, paid the same for labor, used the same machines and had the same general costs to bear. Each shop arrived at the same cost for a yard of the material. Yet, each overhead charge percentage, reckoned direct on labor, lay within the limits of "five" and "three hundred." That is how uniform costing works always. —M. P. DALTON,
Consultant,
Sevenoaks, Kent, England.

Whither Are We Bound?

Al is certainly a typical example of the kind of business man who is largely responsible for the conditions that made the NRA necessary. He may be honest as far as not taking money that belongs to another, but he is not honest in saying that "the whole thing was unnecessary." We had been told that prosperity was "just around the corner" for three years, but the corner kept getting farther away. Now, when NRA restores confidence enough to start business moving, Al says it would have come anyhow.

With business unrestrained the few (?) dishonest men, which Al admits exist, developed abuses that made more radicals than all the propaganda ever attempted. The greedy few have made regulation necessary, and we are going to have more of it, especially in business that directly affects the people as a whole.

If Al wants to stay honest, he will welcome regulation that will prevent his greedy competitor from chiseling on prices or wages. —CHARLES F. HENRY.

Government supervision of industry will be very detrimental to capital, and farsighted capital has fast been going out of the country. An example of the folly of placing faith in governmental supervision is illustrated by its control of the railroads during the World War. Equipment of all kinds was almost ruined. Railroad men loafed on the job, many of them playing baseball and shooting craps during working hours.

When the railroads were returned to their owners, Uncle Sam practically said, "Here's your junk." Now, thirteen years after returning this junk, the beneficent Government loaned to the despoiled railroads a fraction of the damage caused when controlling them.

Thinking men can foresee management of 1940 to 1950 laboring under the most oppressive handicaps that American industry has ever experienced. My sympathies are with those of the coming decade who will have the job of making gold from disintegrating junk, spoiled, lazy labor and lackadaisical minor executives. —E. E. GAGNON,
Mechanical Superintendent,
Raybestos-Manhattan, Inc.

• IDEAS •
FROM PRACTICAL MEN

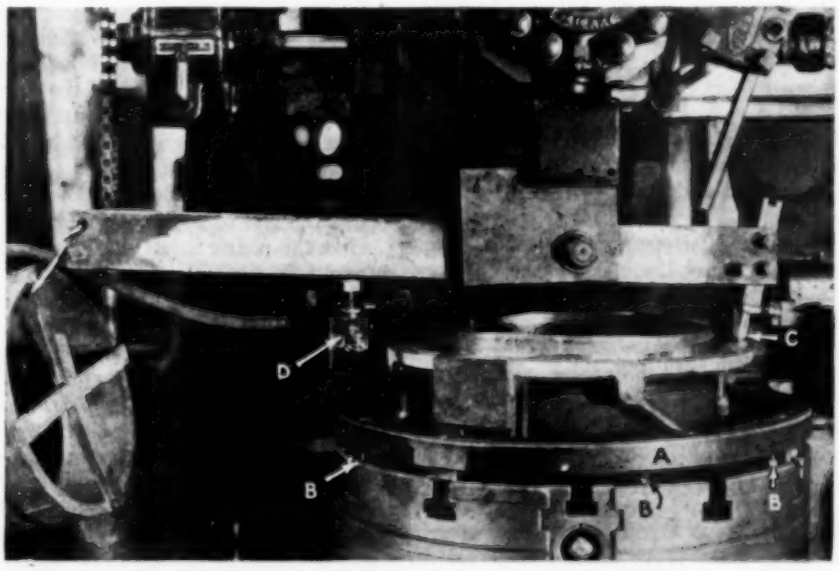
Irregular Contours Faced on a Boring Mill

FRANK C. HUDSON

Fitting port hole rings to the hull of a ship used to be a job for the mechanic who could handle a hammer and chisel. The contour was laid out and the metal cut away to fit the side plate on the vessels. The Newport News Shipbuilding Company has abandoned this practice and now machines the surface to fit the plate in much less time and with far greater accuracy.

Instead of being chipped and fitted, the rings are faced on the Bullard machine shown. The variations from a flat surface are measured and the contour is transferred to the ring *A* which is fastened to the table. This ring is made flexible by occasional slots and its shape is adjusted by jack screws as at *B*. When adjusted, with reference to the brass ring which is held in special jaws, the tool *C* produces the proper face. This tool is controlled by the lifter *D* which rides up and down on the ring *A* as it revolves and transmits the vertical motion to the tool through a bar, which is pivoted on a plate held in the turret tool holder. A weight at the outer end of the bar keeps it in contact with the lifter, and holds the roll in the lower end of the lifter in contact with the ring.

The cutting tool is fed across the surface of the ring by the movement of the tool head on the cross slide.



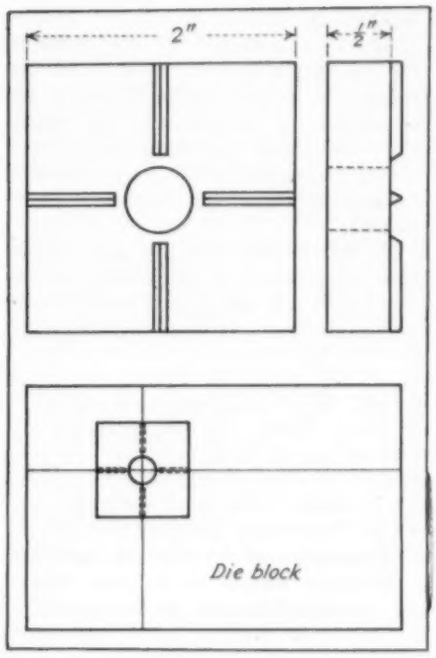
A simple and rapid method of facing port-hole rings to suit the contour of the ship's plate is shown

Center Punching on Scribed Lines

C. W. CASTLE

In most up-to-date shops, drawings for dies are laid out so that all dimensions may be measured from the upper and the left-hand edges of the die blank. All distances, whether angular or radial, are measured from one or both of the edges mentioned, and all scribed lines from one edge are, therefore, at right angles to the lines from the other edge. Accurately center punching the dimension at the point of intersection of a horizontal and vertical line is a difficult matter because one cannot hold the punch exactly vertical and at the same time be sure that its point is exactly at the intersection of the lines. Blocks with a hole at the center on a close-fitting centerpunch have been tried, but show little improvement.

A sketch shows a block and centerpunch device that will automatically center itself over the intersection of two



This block facilitates making punch marks on scribed lines

lines drawn at 90 deg. and will, at the same time, act as a tell-tale, if the top and side of the die block are not ground accurately at the proper angle.

The block for this device should be about ½ or ⅝ in. thick, and 2 in. square. The hole for the center punch can be reamed small enough for a ¼ in. center punch or can be made ⅜ in., and a ring punch used after the center punch. The center punch itself should be made of accurate drill rod or tool steel ground to fit the hole. The block should be of high carbon steel, hardened in oil and the knife edges should be ground and honed to a sharp edge. The angle of the knife edge can be anywhere between 22½ and 45 deg. The scribed lines are so shallow that the angle is not important as long as the edges are sharp. It is obvious that if two of the knife edges are placed in a vertical scribed line and two in a horizontal line, the center punch will be at the intersection of the two lines. It is not necessary to scribe the lines any deeper than usual.

Sharp-Corner Grinding
Discussion

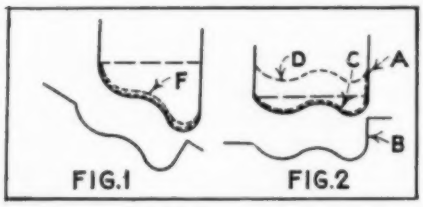
HARRY SHAW
Consulting Engineer
Heywood, Lancashire, England

When a seemingly complicated and not obvious method of doing something is employed, it behooves one to carefully consider all sides of the subject before offering criticism.

In his discussion of the article by Walter Wells under the title given above

(*AM*—Vol. 77, page 86), M. P. Dalton (page 573) does not see the necessity for grinding with a wheel on which the contour is dressed as in Fig. 1 in the accompanying illustration. He thinks the wheel should be dressed as in Fig. 2 because when the wheel is to be dressed to another shape, less material will be wasted.

If Mr. Dalton has had any experience in grinding, he will realize that to grind with the side *A* of the wheel con-



An analysis of the wear of formed grinding wheels shows that first conclusions may be in error

tacting with the shoulder *B* of the work is by no means as satisfactory as when the curved surface of the wheel contacts with the flat surface of the work, as happens in Fig. 1 when the work is being fed to the wheel.

When two flat surfaces come together, as *A* and *B* in Fig. 2, there is always a tendency for the wheel to glaze and cut badly. Furthermore, the wheel will wear as indicated by the dotted line *C*, forming a step in its side, so that to preserve the shape of the wheel over its full face, the abrasive material must be removed to *D* at each dressing—a far greater waste than would occur with the conditions as in Fig. 1, where the abrasive has to be removed up to *F* only.

Computing Dimensions for Jig-Boring Machines

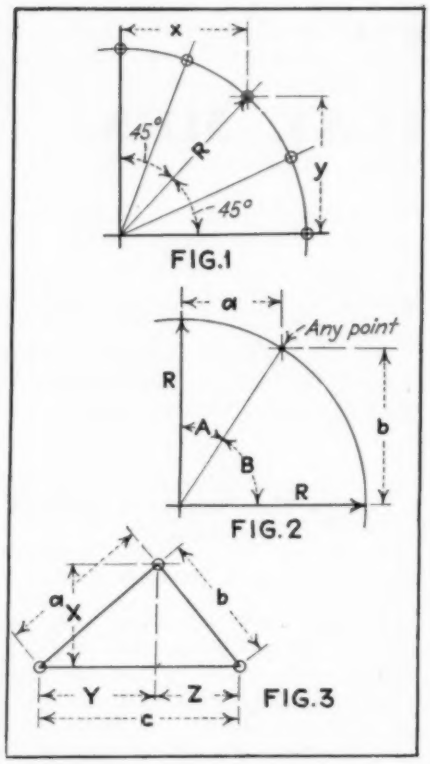
C. W. HINMAN

When determining either straight-stepped or circular-stepped dimensions for the jig boring machine, several simple but pertinent conditions should first be considered.

1. Only in circles having an even number of equally spaced holes are the holes diametrically opposite.

2. An even number of holes in a circle affords an easy opportunity to check the accumulated circular-stepped dimensions at 90, 180, 270 deg. and so forth.

3. If the arc subtending a right angle is divided into an even number of equally spaced holes, the number of spaces is odd. Conversely, if the arc is divided into an odd number of equally spaced holes, the number of spaces is even, and the angle that subtends the two middle spaces is bisected by the



A few simple rules for computing dimension on the jig borer

same line that bisects the right angle at 45 deg. In this case, x and y in Fig. 1 are equal and can be checked by the formula

$$\frac{R}{1.4142}$$

4. If from any point in an arc subtending a right angle, a complemental line is drawn; to find the straight dimensions from the point to either side of the right angle, as in Fig. 2, multiply the radius by the sine of the angle opposite the side required. Thus

$$a = R\ (\sin A),\ b = R\ (\sin B),\ \sin A = \frac{a}{R},\ \sin B = \frac{b}{R},\ R = \frac{a}{\sin A} \text{ or } \frac{b}{\sin B}.$$

These formulas are useful in computing straight dimensions from either side of the vertical and horizontal diameters of a circle.

5. If circular-stepped dimensions are necessary, use the "Computations for Laying-Out Holes in a Circle" (*AM*—Reference Book Sheet, Vol. 75, page 401).

6. Locating the holes, by straight dimensions, for three meshed gears is a frequent problem. In Fig. 3, dimensions *a*, *b*, and *c* are the given center distances between the gears.

$$Y = a^2 - b^2 + \frac{c^2}{2c}.\quad Z = c - Y,\ X = \sqrt{a^2 - Y^2} \text{ or } \sqrt{b^2 - Z^2}.$$

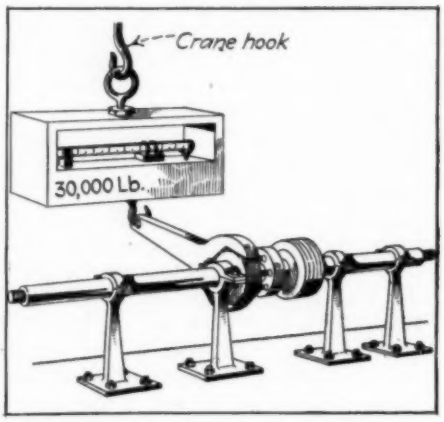
Stepped dimensions are accurately checked by finding each of their successive differences. The first step, plus the sum of all the successive differences should equal the last or longest step.

Securing Pistons to Rods

JOHN TALBOT

In one design of gas engine, the piston is secured to the center of the rod, the rod being about 12 ft. long and 4 in. in diameter and the piston about 6 in. wide and 15 in. in diameter. It is essential that the piston be held tightly in the center of the rod, for should it work loose the results might be disastrous. The manufacturer has solved the problem by the ingenious arrangement illustrated.

The piston is slipped on from one end of the rod and comes to rest on a bearing surface. It is secured in place against a shoulder both by the fit on the



The crane is used to operate the wrench for screwing up the nut, the scale registering the amount of pull

rod and the pressure of a ring nut screwed against it. When I expressed surprise at a ring nut holding the strain and asked how it was pulled up tightly enough, the shop superintendent laughed and said, "Oh, we use a 30-in. wrench for that job." They did, but the wrench was at the end of the crane hook.

After the piston is put on the rod, the ring nut is run up against it, then a big hex nut having no threads, but provided with four stub pins, is put on after it, the pins engaging corresponding holes in the side of the ring nut. The assembly is then put into a fixture consisting of four heavy pedestals bolted to the floor and provided with caps to prevent the rod from turning as the ring nut is screwed up. The wrench is slipped over the hex nut, the pins are engaged in the ring nut and the piston is screwed up to the shoulder. For the final tightening, the outer end of the

wrench is hooked to a compact scale hung from the crane hook, the scale being set to weigh 30,000 lb. Then the craneman operates the hoist until the scale beam balances at 30,000 lb. This shop has never been troubled by a loose piston.

Milling Parts in Multiple

F. SERVER

The tools for a sequence of operations terminating in the production of feed fingers for chain elevators are shown in the illustration, a finished finger being shown in Fig. 1. The fingers are milled from blanks cut from flat, steel bars $\frac{3}{8}$ in. thick and are pack hardened at *A*. Referring to Fig. 2, one side of the work is shaped by the pair of cutters shown in the upper left-hand corner, and followed by a second operation using the same cutters and the same fixture, the work being turned over and machined as shown in the lower left-hand corner.

In the next operation, the long edges, the short, beveled surfaces and the undercut are milled in the fixture shown in Fig. 3. In this operation, an angular cutter in conjunction with the angular set-up of the work provides means for taking the angular cut. Another fixture, Fig. 4, is provided for holding the work while milling the short angle *B*, Fig. 1, thereby completing the operations.

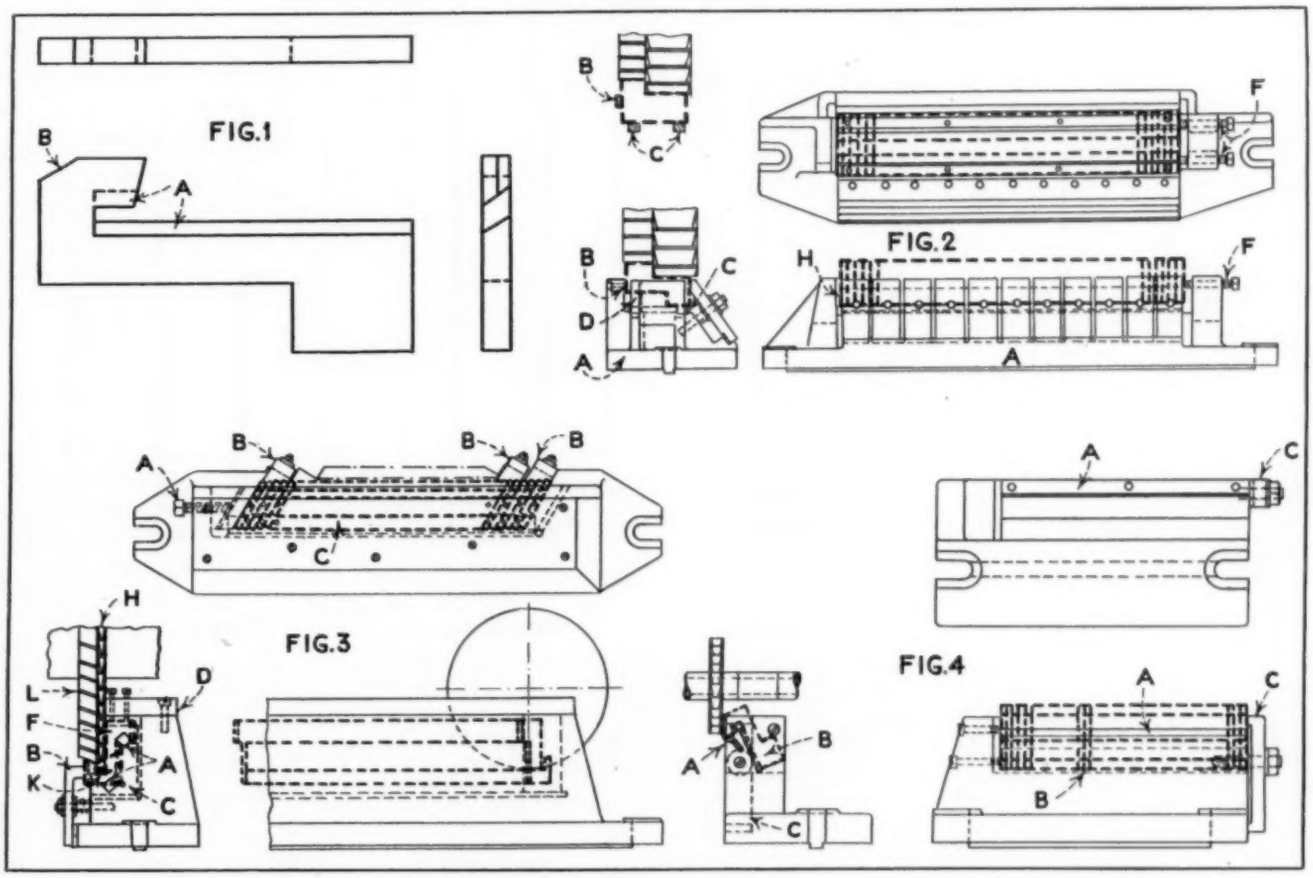
In the fixture in Fig. 2, the cast-iron base *A* has steel locating-bars at the lower edge and at the end. The bar *B* is used in both operations, while the two bars *C* are attached to the fixture for the first operation only. In the second operation, the set-up is as shown in the lower view. Here the bar *B* and a thick bar *D* are provided to level the work where it was step milled in the first operation. The fixture is filled with parts throughout its whole length, and the screws *F* force them against the steep plate *H*, which is backed up by the solid casting to withstand the thrust.

A series of eleven clamps is used, each of which has a helical spring on its bolt to lift it clear of the work in loading. Each clamp contacts four pieces of work, the work being sufficiently uniform to permit efficient clamping that number of parts. In operating this fixture, all the work in the batch is first milled as shown in the upper left-hand corner, followed by burring, turning over and then milling as shown in the lower left-hand corner.

All the angular cuts are made by straight-through milling in the fixture shown in Fig. 3, the work being set at an angle and clamped endwise by the two screws *A*. Clamps at *B* hold the back of the work against the steel angle-block *C*, each clamp being stepped to contact four parts. Since the parts must be clamped very securely for this operation, the overhanging plate *D* is provided. It has two rows of screws, each screw contacting one part. The long, beveled surface at *F*, the short angular surface and the undercut are milled in this set-up.

In beveling the ends of the fingers, they are held in the fixture shown in Fig. 4. The work is set up on the steel plate *A* at the correct angle, resting on the finished pad *B*, and is held by the clamp *C*. No other clamping is necessary because the cut is comparatively light.

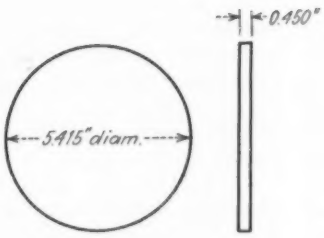
The quantity of parts held in the fixtures permits a fairly long run between loadings, thereby reducing the ineffective cutting time due to the cutters approaching and leaving the work. While work is being milled, the operator has time between loadings to burr and prepare another group of parts for holding in the fixture.



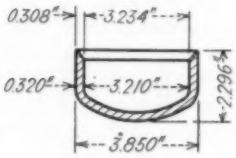
The finished piece in Fig. 1 is milled from a blank cut from a flat, steel bar and is held in multiple for successive operations in the fixtures illustrated. The first two operations are performed in the first fixture without change of cutters

Press Work Pressures

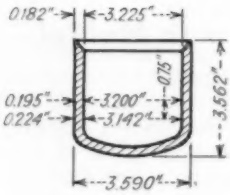
Series XXVII—*Drawing*



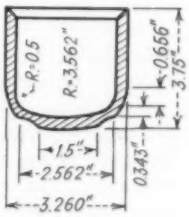
Blank



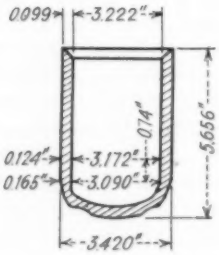
Cup



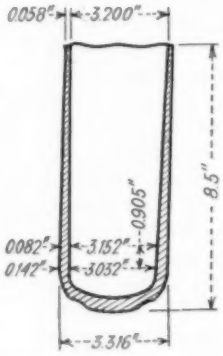
First Draw



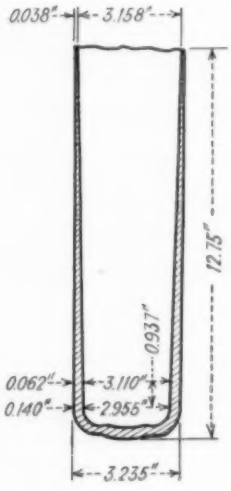
Indent



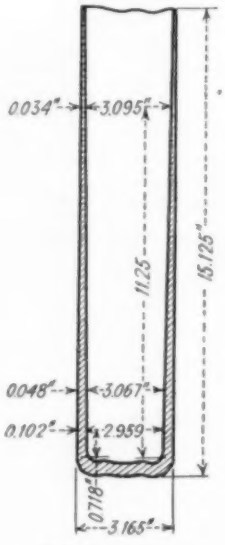
Second Draw



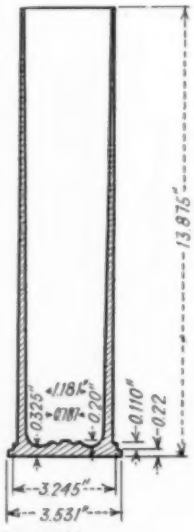
Third Draw



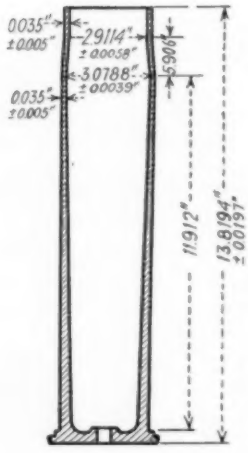
Fourth Draw



Fifth Draw



Heading



Taper

Material--Brass, 0.450 in. thick by 5.415 in. in diameter

Operation--Draw a cartridge case

Pressure--Cup -	85	tons
First draw -	75	
Indent -	500	
Second draw -	50	
Third draw -	30	
Fourth draw -	20	
Fifth draw -	10	
Heading -	1,000	
Taper -	20	

Note: Piece annealed after each draw and at the mouth after heading

Contributed by C. W. LUCAS

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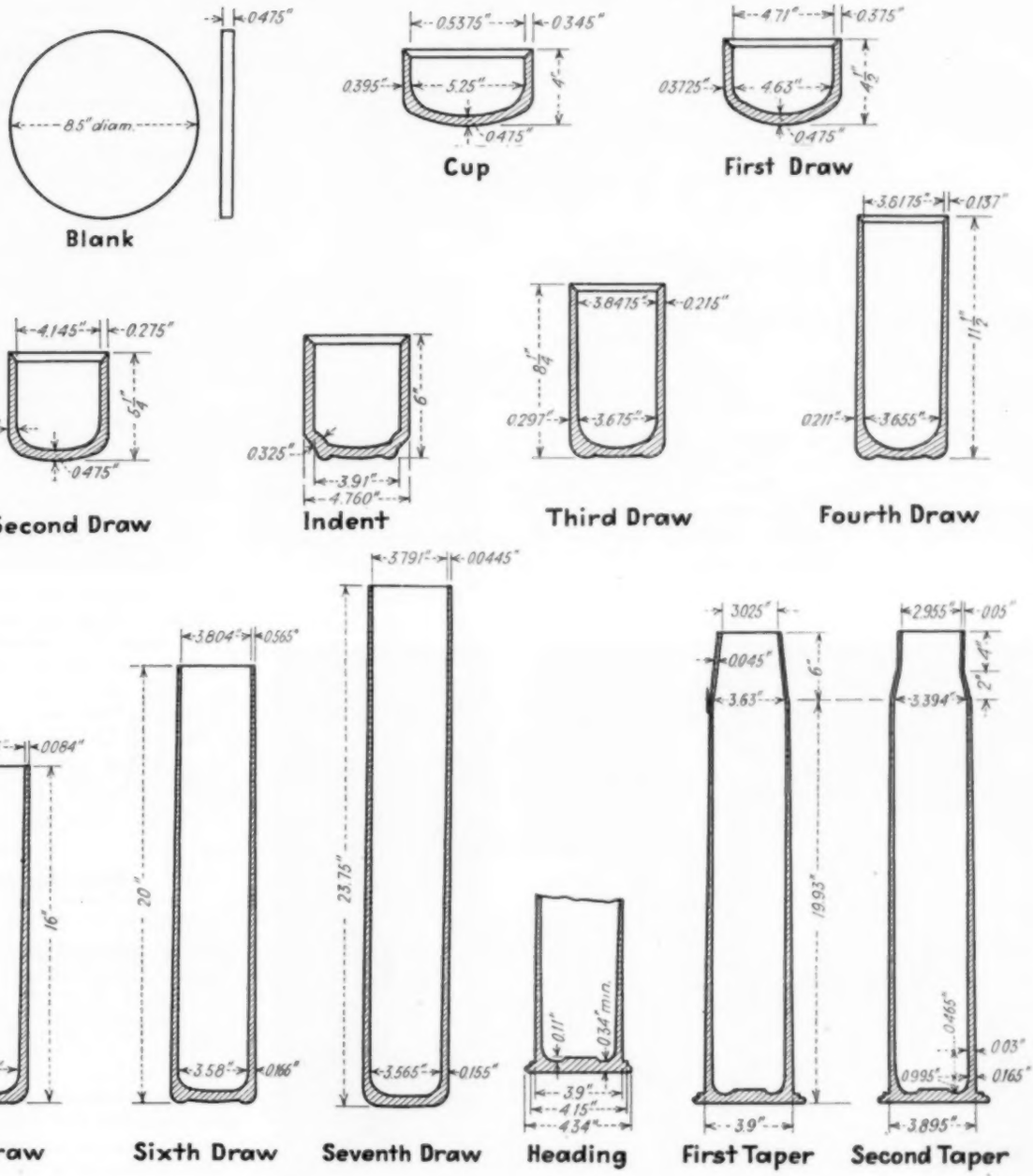
Press Work Pressures

Series XXVII—*Drawing*



Material--Brass, 0.475 in. thick by 8.5 in. in diameter

Operation--Draw a cartridge case

Pressure--		
	Cup -	100 tons
	First draw -	75
	Second draw -	75
	Indent -	800
	Third draw -	65
	Fourth draw -	50
	Fifth draw -	50
	Sixth draw -	45
	Seventh draw -	40
	Heading -	1,500
	First taper -	45
	Second taper -	45

Note: Piece annealed after each draw and twice at the mouth, first after heading and again after the first taper

Contributed by C. W. LUCAS

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SHOP EQUIPMENT NEWS

Heald No. 81 Internal Centerless Grinder

Through the combined efforts of the engineers of the General Motors Corporation, Cincinnati Milling Machine & Cincinnati Grinders, Inc., and The Heald Machine Company, Worcester, Mass., the Heald internal centerless grinders have been developed. These grinders are entirely automatic in operation and the size of the finished bore is held within very close tolerances by either the "Size-Matic" principle or the "Gage-Matic" principle. These machines can be made with both sizing principles embodied therein, whereby either type can be used as conditions warrant. The change from one type to the other is made in a simple manner.

The principle of external centerless grinding consists primarily of passing a workpiece between a rapidly rotating grinding wheel and a slowly rotating regulating wheel upon a work rest or blade, one of the wheels being tilted to give the necessary feed to the work.

In internal centerless grinding machines it is not possible to pass the work through the machine, but the rotating regulating wheel, together with rotatable work rest, or stationary blade, and pressure rolls, are used. The regulating roll rotates and governs the rate of rotation of the workpiece while the grinding wheel is removing material from the bore. In this case the regulating roll takes the place of the grinding wheel of the external machine while the pressure roll takes the place of the regulating wheel thereby providing the usual grinding throat. Practically perfect concentricity between the bore and the outside diameter is obtained; in fact, when a workpiece is placed on an arbor and swung between centers the indicated concentricity is within 0.0001 in.

There are two ways of locating the work in internal centerless grinding:

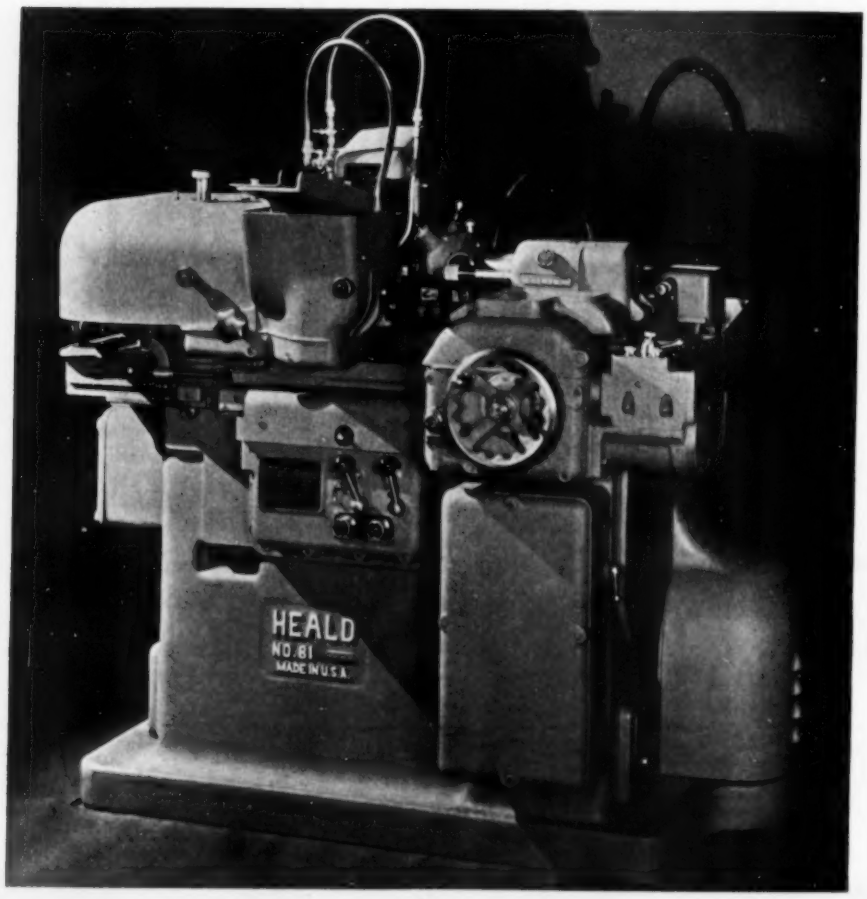
1. Locating and squaring up from the outside diameter.

2. Locating from the outside diameter and squaring up with the back face.

When locating and squaring up workpieces from the outside diameter the lands on the rolls are slightly less than the width of the workpiece, but when squaring up with the back face the lands on the rolls are narrow so that they do not have any great tendency to square up the workpiece. In order to hold the workpiece against the backing plate the pressure and regulating rolls are skewed so as to force the workpiece in the direction of the backing plate.

In setting up a machine using plug gauges a finish ground workpiece is slipped over the gauges and the rolls are adjusted to contact with the outside diameter. In setting up a machine using the Size-Matic principle a special plug having a portion of its length ground to the same diameter as the outside diameter of the workpiece is used.

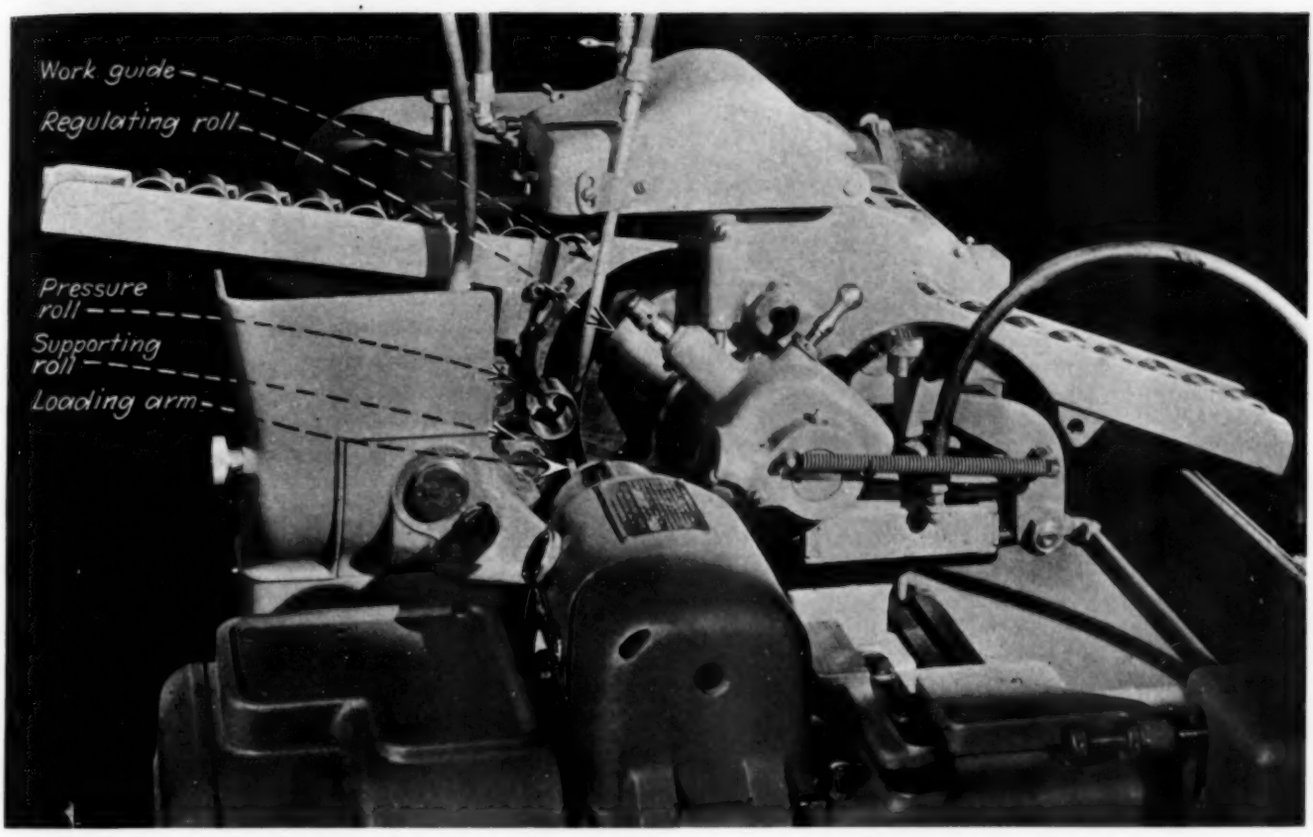
The centerless loading cycle starts after the finished workpiece leaves the wheel and is controlled by a hydraulically actuated mechanism, which is interlocked with the table movements in such a manner that it is impossible for



Straight, tapered, interrupted or blind holes are finished automatically on the Heald No. 81 Internal Centerless Grinder

Specifications

Maximum length of hole that can be ground ..... 3"
Maximum outside diameter of work.... 3"
Minimum diameter of hole that can be ground...Not less than ½" recommended
Maximum included angle of taper (Standard Size-Matic only)..... 30°
Center of wheel spindle from floor.... 46½"
Table speeds unlimited between 0-30 ft. per min



The work is held between three rolls and rotates on its own outer surface. When ground to size, the loading arm swings up, ejecting the finished piece and bringing down a new part into the rolls for grinding

the table to start toward the wheel until the cycle is complete. When a workpiece is finished the table runs out to loading position where the work is ejected from the machine and a new workpiece is positioned for grinding by the loading arm. The loading arm moves in a clockwise direction and discharges the finished workpiece over the regulating roll and at the same time a cam on the loading arm shaft actuates a work stop which allows an unfinished workpiece to leave the loading chute. The workpiece leaving the chute first rests on the back surface of the loading arm and as the arm moves in a counterclockwise direction the workpiece drops onto the regulating roll and is led into position on the rest roll.

As the loading arm starts in its clockwise movement a cam on the loading arm shaft causes the pressure roll to be moved away from the workpiece so that it can be ejected from the machine and a new one placed in position after which the pressure roll returns to its original position where it is held by adjustable spring pressure.

The speed of the regulating wheel is generally fixed and, as it drives the work by its outside diameter, different workpieces having the same general proportion between the bore and outside diameter will all run at approximately the same surface speed. If it should be necessary to change the speed of the regulating wheel for a workpiece having a large outside diameter and a small bore, it can be accomplished by changing pulleys.

The work driving unit which provides the regulating wheel is a compact, self-contained unit, having an individual ¼-hp. motor to drive the regulating wheel spindle, carried on a sub-base which is pivotally mounted on the reciprocable table so that taper work can be ground. This work driving unit is transversely adjustable relative to the table movement in order that different lots of workpieces having different outside diameters can be ground. The supporting and pressure rolls are carried by a bracket bolted to the sub-base, the supporting roll being held stationary in adjusted position while the pressure roll may oscillate.

The wheelhead is mounted on a bridge spanning the table ways. Straight, tapered, continuous, interrupted, open, or blind holes, in parts having finished cylindrical outer surfaces, can be readily ground. By having a fixed relation between the cross-slide and the control box it is possible to use positive mechanical controls.

The cross-slide is actuated by means of a screw having a spring take-up to eliminate backlash, The cross-feed mechanism is hydraulically actuated whereby a smooth, continuous feed is imparted to the grinding wheel at any rate suitable for the work being ground. By having this mechanism independent of the table reciprocations the relative speed of the table and feed of the wheel can be readily obtained which assists materially in obtaining accuracy, finish and production.

Using a hydraulic medium for actuating the feed mechanism makes possible five separate feed adjustments, although seven distinct functions are performed by the cross-slide during each grinding cycle. These functions consist of a pick-up feed upon entry of the wheel into the work, reduction of feed to roughing feed, roughing feed to a semi-finish feed, stopping of feed movement to true the wheel, a further reduction of feed to practically nothing for a spark-out feed, and finally, upon the hole reaching the predetermined size, backing off the wheel and compensating for wear due to grinding and truing. Where an extremely high finish is not necessary, the spark-out feed can be eliminated. The cross feed screw is directly connected to the hand wheel for ease in setting up the machine.

As the table moves to loading position the piston in the cylinder cuts off

its exhaust port and forces the fluid through an auxiliary port which is connected to a vane-type motor on the end of the loading arm shaft, thus causing the loading arm to move in a clockwise direction to eject the finished workpiece. The table is reversed when the loading arm is at the top of its stroke and then the fluid under pressure from the pump flows directly to the vane motor and from there to the cylinder to cause the table to move the workpiece to the wheel, the loading arm having returned to its lower position with a new workpiece prior to the table picking up its working rate of travel. The wheelhead used with this machine is known as the Heald Red Head which has special super-precision matched bearings and is built for speed.

Automatic compensation is provided to take care of the reduction in wheel diameter due to wear and truing, whereby the wheel is always maintained in correct relation to the finished size of the workpiece.

To prevent damage to the machine when the wheel reaches its smallest allowable diameter, a limit switch adjacent to the cross-slide stops the entire machine. This patented function makes it possible for an operator to run a battery of machines without the necessity of watching the wheel wear.

The main drive for the machine is obtained from a 5-hp., 1,800 r.p.m. motor mounted on the rear of the base close to the floor to minimize any vibration. There are no gears or chains employed as all drives from the motor are by multiple Vee belts or flexible couplings.

The oil pump which supplies fluid under pressure to the hydraulic system is directly connected to the motor by a flexible coupling, and the water pump, located on the far side of the oil pump, is also connected to the motor by a flexible coupling. Oil for the hydraulic and lubricating system is filtered. Coolant is supplied from a 30-gal. tank. Force-feed lubrication is used for the table ways and the flow of the oil is observed through a window in the base.

The Size-Matic control for size depends upon the relative positions of the diamond and regulating roll and the control cams directly associated with the cross-feed screw. The result of this type of control is to grind successive workpieces to a uniform wall thickness regardless of the number handled at a time. In this case the finished size of the bore varies with the outside diameter of the work and the size variation equals the accuracy of automatic sizing plus the variation in outside diameter which is due to the fact that the wall thickness is a fixed dimension. It has been found more satisfactory to use the Size-Matic principle of size control for taper bores due to lack of substantial gauging points.

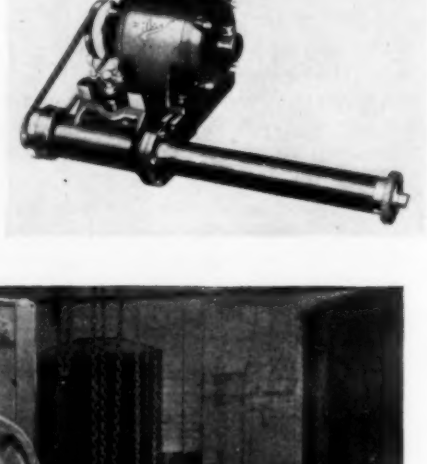
The Gage-Matic control for size depends upon plug gauges which hold the bore to a definite size. With this manner of controlling size the wall thickness of successive workpieces will vary in proportion to the outside diameter and the closest size tolerance when grinding one piece at a time equals the maximum accuracy of the sizing device. A machine having Gage-Matic control has the greatest accuracy when grinding workpieces one at a time but when grinding two or more pieces at a time the Size-Matic is preferable.

Elwell-Parker 25-Ton Die Truck

The Elwell-Parker Electric Co., Cleveland, Ohio, has furnished a 25-ton body die truck to an automobile body plant in Detroit. All four wheels of this truck steer simultaneously, and consideration has been given to the placement of members between the axle to assure alignment regardless of loading and height to which the platform is elevated. Framed sills extending from drive axle to uprights are of steel with heavy steel bars to the steel sub-frame that carries the axle trunnion. The hoist deck consists of two longitudinal channels, laterally braced, and the whole covered with a heavy plate. Elevator pillars are 12-in. wide, solid steel bars and arranged to present wide surfaces for double carrier rollers to bear against. A U-shaped plate ties the uprights together across the angles and face. A ½ in. plow steel cable is connected to the elevator carriage. A separate motor-driven hoist drum lifts the 25-ton load. Each of the four trail wheels are equipped with two 18 x 12-in., solid-rubber tires to distribute the load over the largest possible floor area, consistent with practical steering.

Hisey Internal Precision Grinder

Offered for odd jobs or production work, the internal precision grinder built by the Hisey-Wolf Machine Co., Cincinnati, Ohio, is available in four sizes: ½, 1, 2 and 3 hp. These grinders are provided with constant-speed motors for uniform grinding. Design of the unit is such as to permit internal grinding up to the full swing of the lathe or boring mill on which it is used. The dovetail slide with screw feed and handle affords rapid adjustment of the wheel to the center of the work. This adjustment, because of the angle of slide, does not affect the belt tension. The grinding spindle, together with the motor, can be swung end for end. Direction of rotation of the wheel is reversible through the motor.



Landis Collapsible Taps

The Landis Machine Co., Waynesboro, Pa., has announced a line of collapsible taps to supersede the "Victor" collapsible taps formerly manufactured by the Victor plant of that company. The taps are made in two types: The Landis Style LT, a collapsible tap for either straight or taper tapping, and the Style LM receding-chaser, collapsible tap for taper tapping. The taps can be used either as stationary or rotary taps.

The taps consist of two units, a body containing the operating mechanisms and a head in which the chasers are supported. This design offers several advantages. It permits the use of one tap body to cover a wide diametrical range by the application of tap heads of various sizes. In addition, the same tap body may be used for either right or left hand tapping, providing right- or left-hand tap heads are employed.

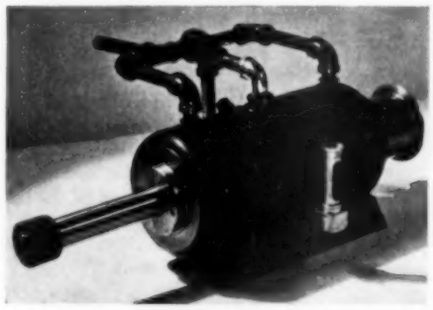
The collapsing mechanism is positive in its action both with respect to locking the chasers in the cutting position and in its collapsing action. The latter is obtained through a hardened steel trip ring coming in contact with the part being tapped, thus insuring uniform thread length. The trip ring is adjustable for various thread lengths.

Tap heads are adjustable for size through an adjusting screw at the front end of the plunger. The screw is self-locking and is of the ratchet type so that a turn of one notch gives an adjustment to the chasers amounting to exactly 0.001 in. Chasers are supported in slots in the tap head and are held in tapered seats in a hardened and ground plunger. Design of the plunger is such as to provide maximum rigidity for the chasers and at the same time to prevent tendency for the plunger to rotate under cutting strains and thereby force the chasers out of alignment. All locating surfaces of the chasers, as well as the thread form itself, are precision ground.

Style LT collapsible tap is made in five sizes which, when equipped with the proper tap heads, cover a combined range from 1¼ to 13¼ in. Style LM receding chaser collapsible tap is also made in five sizes covering a combined range from 1¼ to 12 in. pipe or 1½ to 13⅜ in. in diameter.

Wicaco Water-Cooled Wheelhead

In the water-cooled wheelhead developed by the Wicaco Machine Co., Wayne Junction, Philadelphia, Pa., the oil chamber and bearings are surrounded by a large-size cooling jacket through which the ordinary grinding coolant is continuously pumped. The water jacket

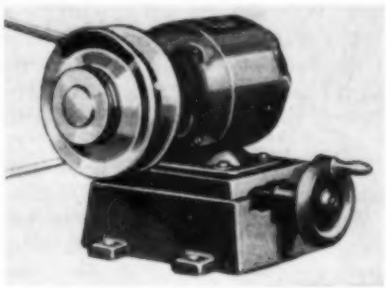


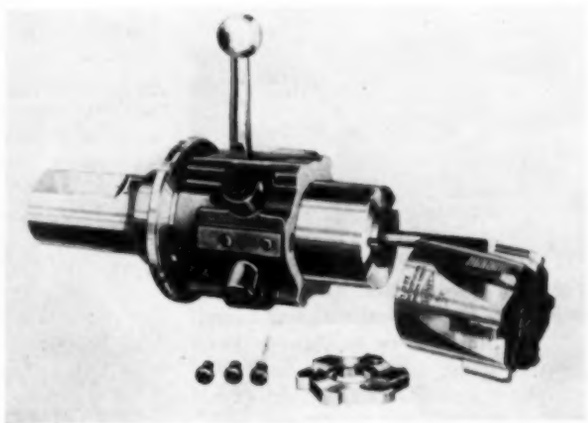
maintains the lubricant at the desired viscosity and eliminates chatter by holding bearing wear to a minimum. The spindle is constructed to allow the ball bearings to absorb only sufficient heat for efficient operation, thereby eliminating the chatter that usually results from cold and too-free bearings. Maximum spindle speed ranges to 10,000 r.p.m. on the large head, 15,000 to 18,000 r.p.m. on the medium-size head, and 25,000 r.p.m. on the small head.

The spindle is designed to rest completely within the bed of the cross-slide and does not overhang. Either swivel- or solid-type spindles can be furnished, and the heads can be fitted with bases designed for all types and sizes of internal grinders.

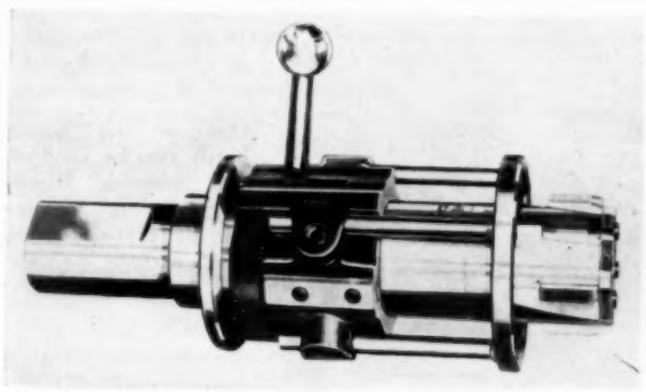
Smith Variable-Speed Pulley

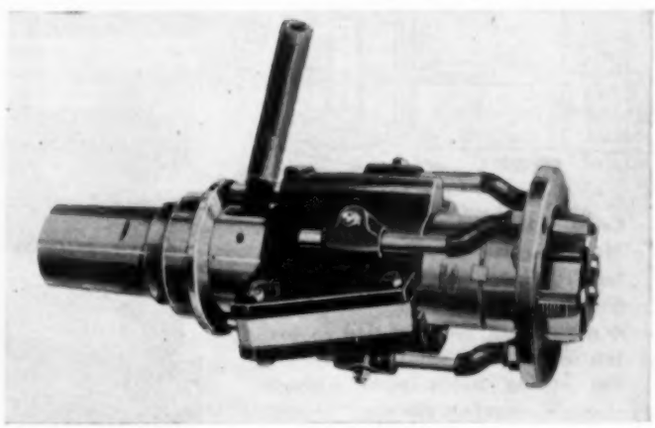
Winfield H. Smith, Inc., Springville, Erie County, N. Y., is offering a variable-speed pulley consisting of two conical sections or two half pulleys. These half pulleys have slots on their faces,





Below—At the left is the Landis Style LT Tap while at the right is the Style LM Receding-Chaser Collapsible Tap. Right—Style LT Collapsible Tap with the head removed from the tap body



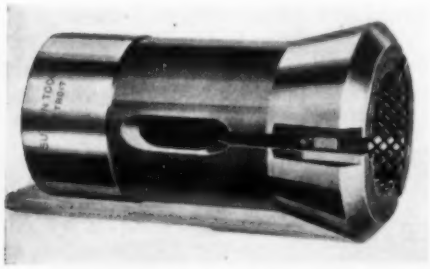


permitting them to interlock and give a cog or positive drive effect. Each half pulley is mounted on a bushing having a spiral key which engages with a spiral groove in the bore of the pulley. The bushing is keyed or setscrewed to the motor shaft. As the base of the motor moves back and forth, the two half pulleys will move together or will separate, causing the belt to run on a small or large diameter of the pulley. The center of the two half pulleys is always in line with the center of the driven pulley to permit use of standard V-belt.

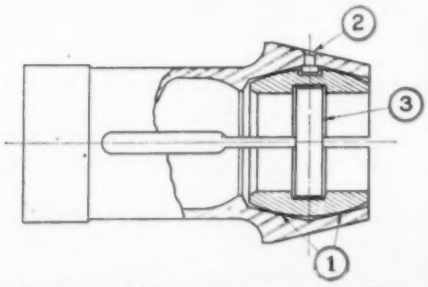
Sutton Style "G" Compensating Collets

A master collet with interchangeable and replaceable pads for automatic and hand screw machines is offered by the Sutton Tool Co., 2842 West Grand Blvd., Detroit, Mich. The pads of this Style "G" collet are self-adjusting. An angular seat in the master and a radius on the back of the pad provide a two-line contact between pads and master, allowing pads to rock in two directions to afford a bearing on the stock. Pins in the master engage blind holes in the pads to prevent the pads from rotating. A flat spring holds the pads securely against the master. Pads have diamond serrations instead of the conventional rectangular serrations for the purpose of developing greater gripping power under reduced tension.

One Style "G" master and different sets of pads will handle practically the full range of one machine. Pads are interchangeable on different makes of machines of the same machine size.



Sutton Style "G" Compensating Master Collet for automatic and hand screw machines

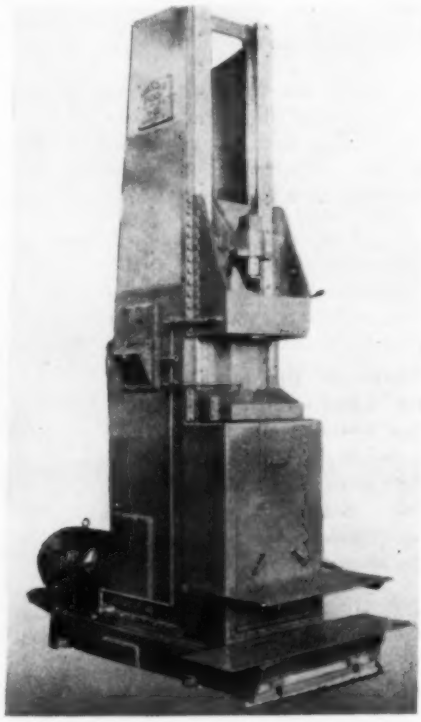


Cross-section of Sutton Style "G" Master Collet showing: (1) Angular seat in master and radius on back of pad, (2) pins in master engage blind holes in pad to prevent pads from rotating, and (3) flat spring holds pads securely against master

American Hydraulic Broaching Machine for 8-In. Holes

The machine illustrated is an addition to the line of automatic and semi-automatic broaching machines made by the American Broach & Machine Co., Ann Arbor, Mich. The capacity of this machine is such as to operate broaches up to 68 in. long. When equipped with an American Type H-125 high-pressure pump operated at 1,200 r.p.m., the machine has a maximum cutting speed of 18 ft. per min. and return speed of 24 ft. per min. A broach elevator, hydraulically operated, lifts the broach up. An automatic broach-connecting head is furnished so the operator does not handle the broach in any way.

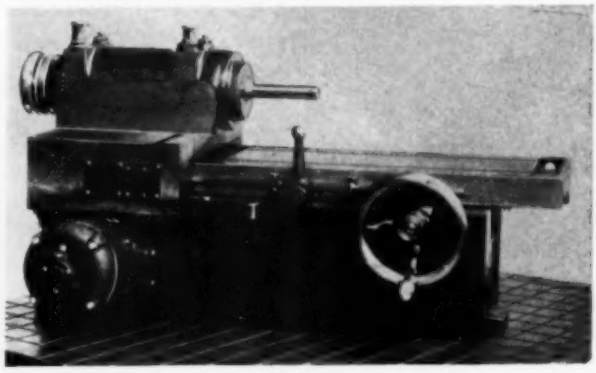
The machine is designed for heavy broaching and is capable of broaching holes up to 8 in. in diameter. Operating cycle of the machine is as follows: work is dropped over the end of the shank which projects through the angular table; machine is started; the broach is raised by the hydraulic broach elevator, automatically connecting in the head on the pulling ram; the pulling ram starts upward, causing the broach to pass through the work on its cutting stroke, and the work drops off and slides down a chute. Automatic stop dogs can be set for any length of stroke. Over-all height of the machine is 14½ ft.



"Simplex" Bench-Type Precision Boring Machine

The Stokerunit Corp., 5325 West Rogers St., Milwaukee, Wis., has developed a "Simplex" bench-type precision boring machine, utilizing tungsten carbide or diamond tools. By provision of a simple quick-acting fixture designed for each particular job, the machine can be adapted to a wide variety of work. Principal specifications are as follows: Range, feed length, 9 in.; rate of feed, 1 to 9 in. as standard, 2 to 18 in. as special; spindle speed, 600 to 6,000 r.p.m.; horsepower, ½ hp. per spindle; feed motor, 1/15 hp.; minimum centers between heads, 5 in., maximum, 9 in.; table width, 9 in.; center line of spindle to top of table, 4 in.; over-all length, 30 in.; and net weight, 410 lb.

The bed has one flat and one V-way. In the bed is built a gear-reducer type of feed motor and a feed screw operated by means of pick-off change gears. On this bed is mounted a bridge that straddles the table and supports one or two boring heads. The boring heads are individually driven by a motor mounted behind or below the machine and are electrically interconnected with the feed motor. The table carries a lever which



One or two boring heads can be used on this "Simplex" Bench-Type Boring Machine for precision boring with carbide or diamond tools

engages the feed at any desired point. Also provided is a rack and pinion arrangement for traversing the table to the cut and back by means of a handwheel at the right-hand end. A limit switch arrangement provides for stopping the table feed at the end of the cut so that the work may be withdrawn with the spindle stopped. A pushbutton for starting and stopping the motor is built into the machine in a convenient place.

The spindle has a precision ball bearing on the pulley end and a long lead-bronze bushing on the front end, tapered on the outside for close adjustment to the spindle. A built-in fan provides circulation of air around the front spindle bearing to permit an unusually close-running fit on the spindle.

• TRADE • PUBLICATIONS

CARBOLOY TOOLS. The Carboloy Co., Inc., 2481 East Grand Blvd., Detroit, Mich., is distributing a booklet "Carboloy Cost Saving Tools" showing representative types of tools made in its plant and now in successful use, briefly summarizing tool savings reported by users, and showing that the tools are not limited to special application.

CHUCKS. The Jacobs Manufacturing Co., Hartford, Conn., has available Bulletin No. 1, entitled "Jacobs Chucks—1934" showing plain and medium-duty plain bearing chucks, heavy-duty ball bearing chucks, keyless chucks, positive drive chucks, single-purpose multiple-drilling chucks, lathe chucks, and portable-tool chuck specifications.

DIEHEADS. A booklet has been announced by the Geometric Tool Co., New Haven, Conn., on a combination diehead for circular or tangent chasers. The various features of these dieheads are completely described, together with accessories for grinding and resetting chasers.

GAGES. Dial and limit gages for many purposes are shown in Catalog No. 6A published by the Standard Gage Co., Inc., Poughkeepsie, N. Y. The contents are divided up as follows: 27 pages concerning dial indicators, 9 pages on dial comparators and dial plug gages, 28 pages on standard limit gages, such as depth gages, length gages, pin gages, taper gages, ring gages and special gages. Johansson gage blocks and accessories, for which the company is distributor, are described in an insert.

GRINDERS. Catalog No. C-33, covering the 5-in. semi-automatic hydraulic cam grinders, is being distributed by the Landis Tool Co., Waynesboro, Pa. Unretouched photographs splendidly show the construction of various mechanisms of the machines.

HOISTS. The Harnischfeger Corp., 4401 West National Ave., Milwaukee, Wis., now has available Bulletin No. RH-1 on the "P & H." Milwaukee Type R electric hoist, showing typical applications, features and ratings.

METAL CLEANING EQUIPMENT. N. Ransohoff, Inc., Cincinnati, Ohio, has produced a booklet on its industrial machinery for tumbling, separating, cleaning, washing, burnishing, plating and pickling of metal parts, the purpose of the catalog being to show that the solution for equipment needed in most cases does not call for special equipment, but rather for application of standard units.

SHEAVES. The Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has prepared a revised leaflet No. 2134-A, giving engineering data, such as sheave diameters, number of grooves, bores and other dimensions, on "Texsteel" sheaves for "Texrope" drives.

TAPS. The Landis Machine Co., Tap Division, Waynesboro, Pa., has for distribution two bulletins giving information and complete specifications of new collapsible taps—Style LT for straight tapping, covered by Bulletin No. G-83, and Style LM for tapered work, covered by Bulletin No. G-81.

TOOLS. A booklet, "Lufkin Tools," published by the Lufkin Rule Co., Small Tool Division, Saginaw, Mich., and known as Catalog No. 6, shows micrometer caliper sets, combination squares, protractors, dividers, caliper scales and other mechanics tools.

• PATENTS •

DECEMBER 26, 1933

Metal-Working Machinery

Feed Mechanism for Automatic Machine Tools. Harry W. Rupple, Shaker Heights, Ohio, assigned to the Cleveland Automatic Machine Co. Patent 1,941,228.

Tools and Attachments

Lathe Center. Elbridge H. Rathbone, Palmer, Mass. Patent 1,941,054.

Grinding and Polishing Machine for Cutting Tools. Leo Steiner, Budapest, Hungary. Patent 1,941,501.

Remote Control for Movable Members of Machine Tools. Keith F. Gallimore, Fond du Lac, Wis., assigned to Giddings & Lewis Machine Tool Co. Patent 1,942,092.

Lubricating System. Harold E. Martin, North Providence, R. I., assigned to Brown & Sharpe Manufacturing Co. Patent 1,942,180.

Machine Tool. Benjamin P. Graves, Cranston, and Arthur F. Bennett, West Barrington, R. I., assigned to Brown & Sharpe Mfg. Co. Patent 1,942,209.

Tools and Attachments

Grinding Gauge. Philip S. Arnold, Flint, Mich., assigned to Charles E. Wisner, Detroit, Mich. Patent 1,941,456.

JANUARY 2, 1934

Metal-Working Machinery

Grinding Machine. Leonard W. Johnson and Wilton F. Hoag, Batavia, Ill., assigned to Johnson Manufacturing Co. Patent 1,941,478.

JANUARY 9, 1934

Metal-Working Machinery

Feeding Device for a Special Lathe. Hans Arni, Falkensee, near Berlin, Germany, assigned to Siemens & Halske, Aktiengesellschaft, Siemensstadt, near Berlin, Germany. Patent 1,942,403.

Actuating Means for Machine Tools. Leo. A. Dumser and Paul S. Jackson, Rockford, Ill., assigned to Sundstrand Machine Tool Co. Patent 1,942,414.

Helical Gear Grinding Machine. Edwin R. Fellows, Springfield, Vt., assigned to The Fellows Gear Shaper Co. Patent 1,942,416.

Hydraulically Actuated Indexing Mechanism. Albert M. Johnson and Chester O. Holland, Rockford, Ill., assigned to Barnes Drill Co. Patent 1,942,927.

Hydraulic Drive for Machine Tools. James K. Douglas, Milwaukee, Wis., assigned to The Oilgear Co. Patent 1,943,061.

Brake Drum Swaging Machine. Ralph H. Rosenberg, Detroit, Mich., assigned to Budd Wheel Co. Patent 1,943,089.

Vertical Automatic Shell-Trimming Machine. Zenas P. Candee, Watertown, Conn., assigned to the Waterbury Farrel Foundry & Machine Co. Patent 1,943,107.

Tools and Attachments

Apparatus for Producing Deep Cups from Sheet Metal. William C. Ludington, Muncie, Ind., assigned to Ball Brothers Co. Patent 1,942,930.

JANUARY 16, 1934

Metal-Working Machinery

Welding Machine. Bertis F. Hamilton, Columbus, Ind., assigned to Noblitt-Sparks Industries Inc. Patent 1,943,600.

Power Tool. William W. Vosper, To-

ledo, Ohio, assigned to the Toledo Pipe Threading Machine Co. Patent 1,943,643.

Tool Carrier. William W. Vosper, Toledo, Ohio, assigned to the Toledo Pipe Threading Machine Co. Patent 1,943,644.

JANUARY 23, 1934

Metal-Working Machinery

Lathe. William F. Groene, Cincinnati, Ohio, assigned to the R. K. LeBlond Machine Tool Co. Patent 1,944,231.

Hydraulic Feed for Machine Tools. Alexander Oberhoffken, Detroit, Mich., assigned to Production Engineering Co. Patent 1,944,362.

Machine Tool Transmission and Control Mechanism. Fred A. Parsons, Milwaukee, Wis., assigned to Kearney & Trecker Corp. Patent 1,944,455.

Nut Placer for Tappers. William L. Clouse, Tiffin, Ohio, assigned to the National Machinery Co. Patent 1,944,653.

Lubricating Means for Metal Shaping Machines. Albert E. Robinson, Cincinnati, Ohio, assigned to the American Tool Works Co. Patent 1,944,828.

Welding Machine. Robert T. Gillette and Laurence R. Leveen, Scotia, N. Y., assigned to General Electric Co. Patent 1,944,863.

Tools and Attachments

Cylinder Honing Tool or the Like. Frank J. Jeschke, Detroit, Mich., assigned to Micromatic Hone Corp. Patent 1,944,660.

Honing Tool. Fred M. Kern, Detroit, Mich., assigned to Micromatic Hone Corp. Patent 1,944,662.

JANUARY 30, 1934

Metal-Working Machinery

Metal Planing and Like Machine Tool. Albert Hewitt, London, England. Patent 1,944,981.

Cam Controlled Hydraulic Feed Mechanism. Robert M. Galloway, Richmond, Ind., assigned to the National Automatic Tool Co. Patent 1,945,034.

Honing Machine. Albert M. Johnson and Walter M. Fairbairn, Rockford, Ill., assigned to Barnes Drill Co. Patent 1,945,044.

Honing Machine. Albert M. Johnson, Rockford, Ill., assigned to Barnes Drill Co. Patent 1,945,045.

Head Mounted Arm Clamp and Elevating Control. David C. Klausmeyer, Hyde Park, and Augustus M. Sosa, Cincinnati, Ohio, assigned to the Cincinnati Bickford Tool Co. Patent 1,945,047.

Electric Rail Clamp for Mobile Drills. David C. Klausmeyer, Cincinnati, Ohio, assigned to the Cincinnati Bickford Tool Co. Patent 1,945,048.

Indexible Multiple Spindle Head for Drilling Machines. Lawrence Lee Schauer, Cincinnati, Ohio, assigned to the Cincinnati Bickford Co. Patent 1,945,084.

Safety Device for Presses and the Like. William Leslie Macfie, London, England, assigned to Andrew & Suter Ltd., London, England. Patent 1,945,116.

Milling Machine. Emmanuel J. Fournier, Detroit, Mich., assigned to Production Engineering Co. Patent 1,945,146.

Press. Arthur A. Byerlein, Detroit, Mich., assigned to General Machinery Corp. Patent 1,945,176.

Machine for Drilling, Screwing, and Tapping. Pierre Edmond Adolphe Marchal, Paris, France. Patent 1,945,326.

Grinding Machine. Carl H. Gerling, Schenectady, N. Y., assigned to General Electric Co. Patent 1,945,396.

Tools and Attachments

Tool Holder. John M. Palmer, Los Angeles, Calif. Patents 1,945,291-1,945,292.

FEBRUARY 6, 1934

Metal-Working Machinery

Automatic Cam Grinding Machine. Albert G. Belden and Charles G. Trefethen, Worcester, Mass., assigned to Norton Co. Patent 1,945,588.

Lathe Headstock. Lyndon C. Cole, Hamilton, Ohio, assigned to General Machinery Corp. Patent 1,945,598.

Machine Tool and Hydraulic Feed Mechanism Therefor. Ralph E. Flanders, Springfield, Vt., assigned to Jones & Lamson Machine Co. Patent 1,945,632.

Loading and Unloading Mechanism for Machine Tools. Edwin R. Smith, Seneca Falls, N. Y., assigned to Seneca Falls Machine Co. Patent 1,945,662.

Multiple Spindle Lathe. Edwin R. Smith and Juel L. Peterson, Seneca Falls, N. Y., assigned to Seneca Falls Machine Co. Patent 1,945,663.

Broaching Press. Walter D. Burger, Forest Park, Ill., assigned to Hannifin Manufacturing Co. Patent 1,945,879.

Hydraulic Driving and Control Mechanism for a Reciprocated Member. Stanley W. Bath, Shrewsbury, Mass., assigned to John Bath & Co. Patent 1,946,348.

Indexed Cam-Controlled Clamping Jig. John Wilson Brown, Jr., Philadelphia, Pa. Patent 1,946,420.

Positioning Means for Drilling Machines. John Wilson Brown, Jr., Philadelphia, Pa. Patent 1,946,421.

Seam Welder. Earl J. W. Ragsdale and John C. Whitesell, Jr., Norristown, Pa., assigned to Edward G. Budd Manufacturing Co. Patent 1,946,445.

Tools and Attachments

Milling Cutter. Peter Hall, Philadelphia, Pa. Patent 1,945,854.

Threading Die and Holder. Oscar E. Koehler, Greenfield, Mass., assigned to Greenfield Tap & Die Corp. Patent 1,945,906.

Pneumatic Method and Apparatus for Forming Metal Articles. Theodore M. Hiester, Dayton, Ohio, assigned to United Aircraft Products, Inc. Patent 1,946,211.

Welding Apparatus. Irving F. Weller, Schenectady, N. Y., assigned to General Electric Co. Patent 1,946,302.

Welding Apparatus. James T. Catlett, Schenectady, N. Y., assigned to General Electric Co. Patent 1,946,305.

Surface Plate. Erik H. Aldeborgh, Poughkeepsie, N. Y., assigned to Standard Gage Co., Inc. Patent 1,946,432.

FEBRUARY 13, 1934

Metal-Working Machinery

Lathe. Lyndon C. Cole, Hamilton, Ohio, assigned to General Machinery Corp. Patent 1,946,839.

Grinding Machine. Herman F. Koestlin, Detroit, Mich., Orville H. Foster, Jr., and Theodore J. Richter, administrators of said Herman F. Koestlin, deceased. Patent 1,946,864.

Machine for Dressing Emery Hobs. Emile E. Tougas, Wollaston, and Martin T. Schumb, Milton, Mass., assigned to Boston Gear Works, Inc. Patent 1,946,888.

Hydraulic Feed Mechanism. Walter Ferris, Milwaukee, Wis., assigned to The Oilgear Co. Patent 1,946,902.

Strip Stock Feed for Presses. Fredcrick J. Littell, Chicago, Ill., assigned to F. J. Littell Machine Co. Patent 1,947,015.

Trip Mechanism for Hydraulically Controlled Gear Unit. Robert A. Schafer, Richmond, Ind., assigned to the National Automatic Tool Co. Patent 1,947,311.

Indexing Mechanism for Automatic Drilling Machines and the Like. Ralph M. Lovejoy, Boston, Mass. Patent 1,947,348.

Tools and Attachments

Collet Chuck. Guy Laughlin, Birmingham, Mich. Patent 1,946,629.

Lathe Center. Walter W. Gairing, Kalamazoo Township, Kalamazoo County, Mich., assigned to Nielsen, Inc. Patent 1,946,684.

Screw Rolling Die and Method. Lee A. Frayer, Ravenna, Ohio, assigned to Roy H. Smith. Patent 1,946,735.

Rotary Cutter. Frank P. Miller, Meadville, Pa., assigned to McCrosky Tool Corp. Patent 1,946,869.

Piston Ring Joint Miller. Jay E. Porter, Muskegon, Mich. Patent 1,946,881.

Collet Chuck. Anton Reimers, Davenport, Iowa. Patent 1,947,060.

Lathe Attachment. John Y. Blazek, Cleveland, Ohio, assigned to Lempco Products, Inc. Patent 1,947,378.